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"No Organization, Business or Profession Will Be of Real Value to the Community Interests That It Is Intended to Serve Unless There Be Born into It Ideals and Purposes That Are Beneficial to the Organization and to the National Life as Well."

Vol. XXV, No. 6 JUNE, 1936

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

TRADE MARK

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THE 84th ANNUAL MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION WILL BE HELD IN DALLAS, TEXAS, AUGUST 24–29, 1936. Hotel Adolphus, Headquarters.

Local Secretary, Walter D. Adams, Forney, Texas.

The 1936 Meetings of the American Association of Colleges of Pharmacy, the National Association of Boards of Pharmacy, Conference of Pharmaceutical Association Secretaries, of the Pharmaceutical Law Enforcement Officials and the Plant Science Seminar will also be held in Dallas, Texas.

Entered as second-class Matter, January 23, 1917, at the Post Office at Easton, Pa., under the act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103. Act of October 3, 1917; authorized July 10, 1918.

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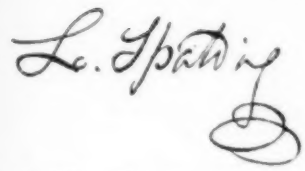
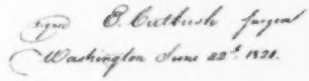


L. Spalding, Chairman, U. S. P. I, 1820.

President of the National Convention for forming a Pharmacopœia.

Lyman Spalding.



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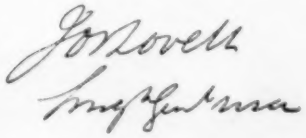
Surgeon General of the U. S. Navy, Washington, June 22nd, 1821.



Surgeon General, U. S. A.

LECTURES ON THE ADULTERATION OF FOOD AND CULINARY POISONS.* "THE DETECTION OF POISONS IN GENERAL AND OF ADULTERATIONS IN SUNDRY CHEMICAL PREPARATIONS, ETC., USED IN MEDICINE AND THE ARTS, WITH THE MEANS OF DISCOVERING THEM: AND RULES FOR DETERMINING THE PURITY OF SUBSTANCES." DELIVERED IN THE UNITED STATES MILITARY ACADEMY, BY JAMES CUTBUSH, A. S. U. S. A., MEM. AM. PHIL. SOC. CORRESP. MEM. COLUMB. INSTIT., ETC., AND ACTING PROFESSOR OF CHEMISTRY AND MINERALOGY IN THE UNITED STATES MILITARY ACADEMY—1823.

* Volume presented to the AMERICAN PHARMACEUTICAL ASSOCIATION by James H. Beal. It was donated by the Author to Prof. Douglass. Errata notice is also Author's handwriting.

TO JOSEPH LOVELL, M.D.[1]

SURGEON GENERAL, UNITED STATES ARMY, ETC.

This volume is respectfully inscribed as a testimonial of respect and esteem, for his public and private character, manifested as well in the discharge of his official duties, with zeal and ability for the good of the service, as in those liberal and enlightened virtues, which not only distinguish the gentleman and man of science, but also the friend of rational freedom, and the true philanthropist.

By his friend and obedient servant,

JAMES CUTBUSH.

Prof. Douglass will please to accept this volume as a mark of respect and esteem from his friend and obed't Serv't

The Author.

P. S. The errata I have not had time to make as there are several mistakes of the printer, notwithstanding all my care and attention

JAMES CUTBUSH.

CHEMIST AND APOTHECARY.[2]

No. 25 South Fourth Street, Phila., "where complete collections of chemical reagents are kept as usual."

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JAMES CUTBUSH.

[1] Dedication of the volume on "Lectures on the Adulteration of Food."

[2] An announcement of October 1819.

[3] The announcement appeared in 1812.

National Formulary Exhibit at the American Medical Association Convention, Kansas City, Mo., May 11th–15th.

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

VOL. XXV JUNE, 1936 No. 6

THE NATIONAL FORMULARY EXHIBIT AT THE AMERICAN MEDICAL ASSOCIATION CONVENTION, KANSAS CITY, MO.

BY ADLEY B. NICHOLS, SECRETARY.

The National Formulary was exhibited with considerable success at the recent convention of the American Medical Association, May 11–15, 1936, this being the first actual exhibit of the sixth edition. It was highly gratifying to note the interest displayed in the new volume, not only by those who apparently have been thoroughly familiar with previous issues, but there were many who had only recently become acquainted with the National Formulary, and recognized its importance and value. This was gratifying for it shows that the book more and more is appealing to the prescriber. Very often, when mention was made of the fact that the N. F. had undergone a marked revision, that its admissions were based upon questionnaires which showed actual use by the medical profession, that more than three hundred old items were deleted and over two hundred new ones added, there would be responses indicating that they were familiar with the situation.

The exhibit proper displayed some of the newer products of the N. F. As the accompanying photograph indicates, the center section was used to display some of the new preparations of specific therapeutic value, including Elixir of Aminopyrine, Elixir of Barbital, Elixir of Phenobarbital, Elixir of Sodium Thiocyanate, Emulsion of Liquid Petrolatum with Phenolphthalein, Syrup of Potassium Guaiacolsulfonate, Compound Ointment of Benzoic Acid and Ointment of Coal Tar. The sides of the exhibit were devoted to the old stand-by of vehicles, elixirs being shown on one side and syrups on the other. In this group were included Aqueous Elixir, Iso-Alcoholic Elixir, Red Aromatic Elixir, Syrup of Cherry, Syrup of Cinnamon, Aromatic Syrup of Eriodictyon, Syrup of Glycyrrhiza and Syrup of Raspberry.

Experience with these annual exhibits has demonstrated that greatest interest is shown in the vehicles which are displayed, definitely indicating that physicians are desirous of writing their own prescriptions to suit their needs rather than prescribing those prepared for them.

It was surprising to note the attention given to the new Iso-Elixir and to Syrup of Cherry, many visitors coming to the booth and asking specifically to see these preparations. This situation brings one thing very definitely to mind, this pre-interest was developed largely through the articles of Dr. Fantus in current medical journals and through a talk he had given recently in the vicinity of Kansas City. It shows, therefore, that where these valuable articles are brought directly to physicians, they are readily and largely accepted. If the pharmacists will realize this situation and acquaint the physicians with these items, greater possibilities will be developed.

With each stock bottle of material displayed there was also included a four-ounce prescription, showing specifically the application of the article in actual practice; in the case of the Iso-Elixir, several prescriptions were thus illustrated. Tincture of nux vomica and aromatic spirit of ammonia were diluted with Aromatic Elixir and with Iso-Elixir, the results presenting a striking contrast. Iso-Elixir was used also as a solvent for one-half grain of phenobarbital per teaspoonful and again for a therapeutic dose of four grains of terpin hydrate. Bromides, chlorides and acids were dispensed with the syrups to demonstrate the masking properties of the latter.

A new eight-page booklet was prepared and distributed to those interested; it covered the salient features of the vehicles with specific applications under each. Another section was given to new preparations of a therapeutic nature similar to those on display. The back cover was used to illustrate actual prescriptions for some of the typical products.

An additional supply of booklets has been printed, available for use with similar exhibits throughout the country or for direct distribution to physicians. A number of the state associations have taken advantage of the material for state, county and local organizations.

The National Formulary has been improved; it contains many preparations in which physicians are greatly interested, as the exhibits at the meeting of the American Medical Association have shown conclusively.

The book is the property of American pharmacy, which means that pharmacists should be thoroughly familiar with it and constantly strive to bring it to the attention of the medical profession.

PRELIMINARY NOTICE FROM THE TRANSPORTATION COMMITTEE.

Transportation arrangements for the Dallas meeting have been delayed by the confusion due to the government ruling establishing lower railroad fares throughout the country, which went into effect on June 2nd. Reduced rate excursion fares to Dallas, because of the Texas Centennial Exposition will be in effect, and it is expected that a schedule of these special rates will be published in the July number of the JOURNAL.

Arrangements are being made for an optional post-convention tour through southern Texas and Mexico to Mexico City, and further information about this will also be given in the July number of the JOURNAL.

THEODORE J. BRADLEY, *Chairman*,
Transportation Committee.

EDITORIAL

E. G. EBERLE, EDITOR 2215 Constitution Ave., WASHINGTON, D. C.

COMMENCEMENTS.

DR. GEORGE F. ZOOK, president of the American Council of Education, in a recent Commencement Address said: "The educational system of this country, from the elementary school to the university, has had thrust upon it the responsibility of producing, as far as possible, the actual conditions of vocational and civic life, so that young people may learn the realities through personal participation."

It has been necessary to set up coöperative arrangements whereby they, while still in school, "may secure those personal revelations and values which come only out of actual work experience."

The viewpoint of some, relative to educational training, has undergone a change in studying the capacities of the prospective students—whether they have good coördination and the schools develop these qualifications, rather than analyzing the activity and trying to train and develop the individuals for it. A study of the field for their work should bring the industries nearer to the institutions in which they are trained. The aim of pharmaceutical institutions is to develop pharmacists and the knowledge required in the service of the profession; accordingly a study of the adaptability and qualifications of the matriculants is highly important.

Alumni represent an asset or liability to the institutions and the profession; commencements mark events in the lives of young men and women and the profession of which they are part—these annual events are periods of perlustration.

ASSOCIATIONS.

IT WILL be permitted to speak a word of sorrow because of the passing of a faithful representative of the people, the Honorable Joseph W. Byrns. The high regard in which he was held found expression in his advancement, and his response was in the performance of duty.

Notwithstanding that bills in Congress which interest druggists and pharmacists have not been enacted, probably due to very important national legislation and, recently, because of the untimely death of the Speaker of the House, which may make it impossible to bring to conclusion all legislation, the evidence of coöperation of druggists and pharmacists and the organizations represented is gratifying. Among the bills are: The Tydings, Sheppard, Robinson-Patman, etc. The purpose is not to discuss these measures at this time except in the relation mentioned, and to express thanks for the helpfulness and interest in measures in which we are greatly concerned. The Senators and Congressmen have given their attention because they realized the importance of them and were prompted by duty.

Charles G. Merrell, a number of years ago, said: "No organization or business will be of real value to the community interests that it is intended to serve unless there be born into it ideals and purposes that are not only beneficial to the drug trade but to our national life as well."

The shaping of these activities is not only responsive to our energies and ideals, but on how we impress the public with our coöperative efforts. The attachments

to our profession, business, associations and institutions which make our progress possible are important factors in upbuilding pharmacy and securing the good-will of the people. There is no question regarding the advisability of associations by those who have grown with their organization, relative to coöperation and strengthening the bonds that unite its members for better service in the cause for which they are enlisted. The greater number of associations meet during June, which is the reason for this comment; may the members have in mind the association spirit to urge them in the performance of duty.

While it is realized that the nearing of the adjournment of Congress may result in disappointment, those who are charged with promoting the legislation will continue their efforts.

Mention may be made in closing this comment that material changes have been made in the Copeland bill which should, perhaps, be submitted for hearing. This is really a substitute bill and it might have been better if, instead of presenting a new bill, the present Act could have been made effective by amendments.

THE LIBRARY AND THE MUSEUM.

IT IS gratifying to note that the Library of the AMERICAN PHARMACEUTICAL ASSOCIATION is rendering more frequent service to divisions of the Government and to individuals, pharmacists and others. This applies also to a certain extent to the Museum.

Everywhere there is developing a greater interest in the establishment of libraries; commencement addresses refer to such undertakings, some to special selection of books and others for general libraries. Among the addresses noted, including references of the latter type is a gift of $400,000.00 to Southern Methodist University at Dallas; one of the former is a gift which will make possible the development of an entirely new field in higher education at the University of Maryland—on "Transportation."

Carlyle said that the true university of these days (his) is a collection of books. Commenting, President Roosevelt said: "The new goals of society demand that part of the citizen's leisure time be spent in securing a better understanding of the changing governmental, economic and social concepts. Man must be forever bringing his knowledge up to date if his usefulness as a worker or citizen is to be maintained. The public library serves all purposes of civic life—industrial, social, religious and recreational."

It is hoped that possibilities will develop which will make available as a museum the material of the Stabler-Leadbeater Pharmacy, Alexandria, purchased for the AMERICAN PHARMACEUTICAL ASSOCIATION.

C. O. Lee, as *chairman* of the Section on Historical Pharmacy, made a valuable contribution by compiling the titles of articles contributed to that Section, resolutions and reports. It has been impossible up to this time to publish all the lengthier contributions on the histories of state and national associations and of industrial plants. This report supplies a valuable index and represents much work on the part of Chairman Lee.

SCIENTIFIC SECTION

BOARD OF REVIEW OF PAPERS.—*Chairman*, F. E. Bibbins; Glenn L. Jenkins, John C. Krantz, Jr., Heber W. Youngken, L. W. Rowe, L. W. Rising, C. O. Lee, E. V. Lynn, W. G. Crockett, Frederick V. Lofgren.

THE ASSAY OF SYRUPS CONTAINING HYPOPHOSPHITES OFFICIAL IN THE NATIONAL FORMULARY.*,[1]

BY GLENN L. JENKINS AND CHARLES F. BRUENING.[2]

INTRODUCTION.

Five syrups of hypophosphites are official in the National Formulary, and it is the purpose of this paper to develop methods for the assay of hypophosphites in these syrups, since no official methods are given in the National Formulary.

In a previous paper (JOUR. A. PH. A., 25, 19 (1936)) concerned with the official hypophosphite salts, the literature for methods of assay was reviewed, and several methods used in assaying these official salts were studied critically. Of all the methods of assay tried for the official salts, only two were found satisfactory; the Gravimetric Method and the Bromine Method both yielding excellent results. The Gravimetric Method determines the phosphate, formed by oxidization of the hypophosphite, by precipitating as magnesium ammonium phosphate and igniting this precipitate to magnesium pyrophosphate. The Bromine Method, a rapid volumetric method, involves the oxidization of the hypophosphite ion to the phosphate ion by means of bromine and determination of the bromine consumed, by titrating the iodine liberated by the excess of bromine. These two methods appeared to be applicable to the official syrups and were used in assaying for the hypophosphite content.

EXPERIMENTAL.

The following four syrups, official in the National Formulary, 5th Edition (1926), were compounded: Syrup of Ammonium Hypophosphite, Syrup of Calcium Hypophosphite, Syrup of Calcium and Sodium Hypophosphites, and Syrup of Hypophosphites. The methods used in their preparation were essentially the same as specified in the National Formulary except that all weighings of the salts were made on an analytical balance and volumes made up at 20° C. in volumetric flasks. The Compound Syrup of Hypophosphites offers several apparent obstacles to the Gravimetric Method as well as the Bromine Method and for this reason was not prepared.

A suggested method (1) for the compound syrup is: the oxidation by means of nitric and sulphuric acids and determination of the phosphate either by the volumetric molybdate method or the gravimetric method. In the gravimetric method the molybdate precipitate is dissolved and the phosphate reprecipitated as magnesium ammonium phosphate, finally igniting to the pyrophosphate. This method, using either variation, gives satisfactory results.

In the preparation of the Syrup of Calcium and Sodium Hypophosphites some difficulty was encountered in obtaining complete dissolution of the sugar. Several attempts were made to prepare this syrup using the specified amount of sugar and all met with failure, in that a clear solution was not obtained. Finally, the sugar content was reduced from 750 to 600 Gm. per liter,

---

* Scientific Section, A. PH. A., Portland meeting, 1935.

[1] From the Department of Pharmaceutical Chemistry, University of Maryland, School of Pharmacy.

[2] Abstracted from a thesis submitted to the Graduate School of the University of Maryland by Charles F. Bruening in partial fulfilment of the requirements for the degree of Master of Science.

giving as a final product a clear solution. To expedite solution, the contents of the flask were heated to about 70° C.

MATERIALS.

In the preparation of the syrups, the assayed salts reported in the previous paper were used. The hypophosphorous acid used, official in the United States Pharmacopœia X, was manufactured by a well-known pharmaceutical house and met the tests for purity as described in the United States Pharmacopœia (2). The assay of this acid is considered here.

The methods used and the results obtained are shown in Table I.

TABLE I.

Method.	H_3PO_2, Per Cent.	H_3PO_2, Gm./Cc.
U. S. Pharmacopœia	31.42	0.3594
	31.41	0.3592
Bromine	...	0.3817
	...	0.3811
Gravimetric	...	0.3818

Excellent checks were obtained by the Bromine Method and the Gravimetric Method. The results by the U. S. Pharmacopœia Method are much lower, although the acid conforms to the required minimum of 31 per cent. The United States Pharmacopœia Method determines the acid by titration with standard alkali, using methyl orange as indicator.

The difference between the results given by the U. S. Pharmacopœia Method and those given by the other two methods is probably partly due to dissolved hypophosphite salts and partly due to the choice of indicators. If phenolphthalein is used in place of methyl orange, higher results are obtained.

Rosin (3), in determining the delicacy of the test for the detection of oxalic acid in hypophosphorous acid, states that commercial hypophosphorous acid contains a little calcium which interferes with the test for oxalic acid. Small amounts of calcium and traces of iron were found in this acid and also in another sample of the acid. The presence of soluble salts in the acids was indicated by the formation of a precipitate when sodium phosphate solution was added to a diluted aqueous solution of the acid. Whether the presence of small amounts of dissolved salts in the acid is responsible for the apparent discrepancies of the methods cannot be definitely stated at this time. However, for our purpose since only one cc. is used per liter in the syrup, no great error will be involved in using hypophosphorous acid that contains small amounts of dissolved salts.

GRAVIMETRIC METHOD.

The procedure used for the four syrups follows:

Transfer exactly 50 cc. of the syrup, measured by means of a 50-cc. volumetric flask, to a 250-cc. volumetric flask. Wash the 50-cc. flask with several portions of distilled water, adding the washings to the 250-cc. flask, and finally make up to the mark with distilled water. This dilution to 250 cc. was used for the syrup of Ammonium Hypophosphite and Syrup of Calcium Hypophosphite. For the Syrup of Calcium and Sodium Hypophosphites and Syrup of Hypophosphites the original 50 cc. was diluted to a volume of 500 cc. in a volumetric flask. In either dilution, transfer a 50-cc. aliquot to a 500-cc. Kjeldahl flask; add 30 cc. of nitric acid, 5 cc. of sulphuric acid, and heat until the contents of the flask boil and begin to darken. Then add small amounts of nitric acid, and continue to heat until a clear and almost colorless solution is obtained. Allow the flask and contents to cool, add about 25 cc. of water, and transfer the solution to a 400-cc. beaker; wash the flask with several portions of distilled water, and transfer these washings to the beaker, and finally dilute the solution to a volume of 150 cc. To the diluted acid solution add 2 Gm. of citric acid. In the case of the Syrup of Ammonium Hypophosphite, the citric acid was omitted. Add ammonia (Sp. Gr. 0.9) to the solution until only slightly acid to litmus. Complete the assay following the gravimetric method beginning with the line "add a few drops of HCl," etc.

In some instances, precipitation of the magnesium ammonium phosphate will not take place at a temperature near the boiling point after the addition of the ammonia, and in such cases the solution was cooled until the first appearance of a precipitate and then rapidly stirred until precipitation was complete. The ignition of the precipitate was made in an electric muffle finally heating to 1000° C. for the most satisfactory results.

The results obtained are shown in Table II, the total hypophosphites being expressed as H_3PO_2.

TABLE II.

Syrup of	H_3PO_2 Found, Gm./100 Cc.	H_3PO_2, Calculated Theory, Gm./100 Cc.	Deviation. Gm./100 Cc.	Per Cent.
Ammonium Hypophosphite	2.819	2.820	−0.001	−0.05
	2.819	...	−0.001	−0.05
	2.832	...	+0.012	+0.4
Calcium Hypophosphite	2.770	2.774	−0.004	−0.1
	2.774	...	0.000	0.0
	2.768	...	−0.006	−0.2
Calcium and Sodium Hypophosphites	4.933	4.954	−0.021	−0.4
	4.942	...	−0.012	−0.2
Hypophosphites	5.460	5.453	+0.007	+0.1
	5.466	...	+0.013	+0.2
	5.466	...	+0.013	+0.2

The calculated theory is obtained by using the results of the gravimetric method for the salts.

With the syrup of hypophosphites, it might be mentioned, the weight of sodium salt used was the same as required by the formula although the sample assayed 104.15 per cent of the hydrated salt. In the Syrup of Calcium and Sodium Hypophosphites, however, a smaller weight of the sodium salt was used, this weight being equivalent to the specified weight if the sample had assayed 100 per cent of the hydrated salt.

This method, as developed, appears to be applicable to the syrups as well as to the salts official in the National Formulary. It yields satisfactory results, but has the objection of being an indirect method and is somewhat lengthy.

BROMINE METHOD.

This rapid volumetric method, giving excellent results for the salts, was used for the syrups and the following procedure adopted:

Transfer exactly 50 cc. of the syrup, measured in a 50-cc. volumetric flask, to a 250-cc. volumetric flask. Wash the 50-cc. flask with several portions of distilled water, adding the washings to the 250-cc. flask and finally making up to the mark with distilled water. This dilution to 250 cc. was used for the Syrup of Ammonium Hypophosphite and Syrup of Calcium Hypophosphite. For the other two syrups the original 50 cc. was diluted to 500 cc. in a volumetric flask. In either case, transfer a 50-cc. aliquot to a 250-cc. volumetric flask, and make up to the mark with distilled water. Use 50-cc. aliquots and determine the total hypophosphites as outlined in the Bromine Method beginning with the line "add 50 cc. of 0.1*N* bromide-bromate solution." The time of the standing was 2 hours.

The results are shown in Table III, the total hypophosphites being expressed as H_3PO_2.

TABLE III.

Syrup of	H_3PO_2 Found, Gm./100 Cc.	H_3PO_2 Calculated Theory, Gm./100 Cc.	Deviation. Gm./100 Cc.	Deviation. Per Cent.
Ammonium Hypophosphite	2.813	2.814	−0.001	−0.05
	2.814	...	0.000	0.0
	2.810	...	−0.004	−0.1
Calcium Hypophosphite	2.755	2.755	0.000	0.0
	2.756	...	+0.001	+0.05
	2.754	...	−0.001	−0.05
Calcium and Sodium Hypophosphites	4.925	4.933	−0.008	−0.2
	4.926	...	−0.007	−0.1
	4.930	...	−0.003	−0.05
Hypophosphites	5.377	5.427	−0.050	−0.9
	5.381	...	−0.046	−0.8
	5.386*	...	−0.041	−0.8

* Solution allowed to stand 3 hours.

The calculated theory was obtained by using the results of the assays of the salts by the same method.

The results for the first three syrups are satisfactory, but those for the fourth syrup are slightly low. In a later Table (IV) a higher yield was obtained for this same syrup.

This method, as developed, is applicable to the four mentioned syrups containing hypophosphites official in the National Formulary. The method is a rapid and simple one; results can be obtained in about two and one-half hours. The results are very satisfactory indicating that bromine does not react to any appreciable extent with sugar or glycerine in the concentrations employed in the determinations. The chief advantage of this method is that it is a direct one, determining hypophosphites as such.

STABILITY OF THE SYRUPS.

It has been noted that when some syrups containing hypophosphites are allowed to stand for a considerable length of time there is a color change, the syrup originally being almost colorless and after a period of time changing to a light yellow-brown color. Some syrups, however, remain almost colorless after a long period of time, indicating that the color change does not always take place and not always with all the syrups. The factors usually affecting stability may be enumerated as ingredients, methods of preparation, preservatives and manner of storage.

In this experiment we attempted to determine the stability of the four syrups prepared from a chemical viewpoint only. That is, we determined the hypophosphite content before and after standing by the Bromine Method and by comparison indicate whether the hypophosphites have undergone any chemical change. Of course, the assumed oxidization to phosphate or possibly phosphite may not be the only change taking place with the hypophosphites, but we limited our field to these changes, since they are the most likely to occur. Any decrease in hypophosphite content in the syrups indicates these changes.

The ingredients used in the syrups are all recognized officially as being stable in air, the only tendency being deliquescence.

The effects on stability by different methods of preparation (with different preservatives) have not been studied. The methods of preparation as described in the National Formulary were used with all the syrups. Hypophosphorous acid is used in all the official syrups and sodium citrate in the compound syrups acting as a preservative although both aid in dissolving the salts. Unofficial syrups containing hypophosphites also use benzoic acid and sodium benzoate as a preservative. These preservatives probably prevent the deterioration of the syrup from a bacteriological action as evidenced by lack of mold formation and possibly from a chemical reaction as well.

Regarding the manner of storage, it is the usual precaution of manufacturers to use amber bottles on the theory that the color change is a photochemical one. In this experiment, however, the four official syrups prepared were placed in clear glass containers and allowed to stand, protected from the light for 3 months. At the end of this period no apparent change was noted with three of the syrups, although the Syrup of Ammonium Hypophosphite became a shade darker than the original syrup.

The hypophosphite contents, calculated as H_3PO_2, are shown in Table IV, using the Bromine Method.

TABLE IV.

Syrup of	H_3PO_2 Found in Original Syrup (Average of Table III), Gm./100 Cc.	H_3PO_2 after 3 Months, Gm./100 Cc.	Deviation. Gm./100 Cc.	Deviation. Per Cent.
Ammonium Hypophosphite	2.812	2.812	0.000	0.0
	...	2.816	+0.004	+0.1
Calcium Hypophosphite	2.755	2.758	+0.003	+0.1
	...	2.757	+0.002	+0.05
Calcium and Sodium Hypophosphites	4.927	4.905	−0.022	−0.4
	...	4.908	−0.019	−0.4
Hypophosphites	5.381	5.396	+0.015	+0.3
	...	5.394	+0.013	+0.2

From these results we conclude that the four official syrups examined are stable as far as the hypophosphite content is concerned. The color change noted with the Syrup of Ammonium Hypophosphite is probably due to some of the other substances present rather than to the hypophosphites. These results also give an indication of the precision obtainable with the Bromine Method.

DETERMINATION OF CALCIUM.

A method, similar to that used in the British Pharmacopœia (3), was adopted for the determination of calcium in three of the official syrups prepared. It differs from the method used in the B. P. which employs only a single precipitation, in that the original calcium oxalate precipitate was dissolved and reprecipitated for the most satisfactory results.

Procedure.—Transfer exactly 50 cc. of the syrup, measured in a 50-cc. volumetric flask, to a 250-cc. volumetric flask. Wash the 50-cc. flask with several portions of distilled water, adding the washings to the 250-cc. flask, and finally make up to the mark with distilled water. Dilute a 50-cc. aliquot to 100 cc., add 1 cc. of glacial acetic acid, and heat to boiling. Then slowly add an excess

of a saturated solution of ammonium oxalate, and continue to boil until the precipitate becomes coarsely granular. Remove from the source of heat, and allow to stand 4 hours. Decant the clear solution, and filter it through a small filter paper. Wash the precipitate in the beaker by decantation several times with a 1 per cent solution of ammonium oxalate, filtering each portion through the filter. Finally wash the filter with a small amount of the 1 per cent solution. Dissolve any calcium oxalate on the filter paper by means of 10 cc. of hot hydrochloric acid solution (1 in 3), and wash the filter with hot water, catching the filtrate in the original beaker. Warm the beaker until all the precipitate dissolves, remove from the heat and neutralize with ammonia. Add 1 cc. of glacial acetic acid, and repeat the precipitation as outlined above. Filter and ignite the precipitate and paper gently until the paper is completely burned. Then add H_2SO_4 to the residue, fume off the excess, and finally heat to constant weight at 600° C. Weigh as $CaSO_4$.

The results for the three syrups and the calcium salt are shown in Table V.

TABLE V.

Syrup of	$Ca(H_2PO_2)_2$ Found, Gm./100 Cc.	$Ca(H_2PO_2)$ Present, Gm./100 Cc.	Deviation. Gm./100 Cc.	Deviation. Per Cent.
Calcium Hypophosphite	3.498	3.500	−0.002	−0.05
	3.498	...	−0.002	−0.05
Calcium and Sodium Hypophosphites	3.494	3.500	−0.006	−0.2
	3.497	...	−0.003	−0.1
	3.548*	...	+0.048	+1.4
	3.552*	...	+0.052	+1.5
Hypophosphites	4.480	4.500	−0.020	−0.4
	4.488	...	−0.012	−0.3
Salt of Calcium Hypophosphite	0.5019	0.5021**	−0.0002	−0.05
	0.5018	0.5020**	−0.0002	−0.05

* Single precipitation used.
** Weight of Sample.

Very satisfactory results are obtained by this method, although if only a single precipitation is used high results are obtained.

CONCLUSIONS.

1. In assaying Hypophosphorus Acid the United States Pharmocopœia Method yields low results.

2. The Gravimetric Method developed is applicable to the official Syrups of Ammonium Hypophosphite, Calcium Hypophosphite, Calcium and Sodium Hypophosphites, and Hypophosphites. This method is simple and yields almost theoretical results.

3. The Bromine Method developed is also applicable to the four official syrups listed in 2. This method is rapid, simple, a direct one and yields excellent results.

4. The four official syrups listed in 2 are stable in that the total hypophosphite content remains constant with time.

5. A method has been devised to determine the calcium in the official Syrups of Calcium Hypophosphite, Calcium and Sodium Hypophosphites, and Hypophosphites. The method yields satisfactory results.

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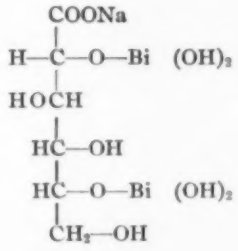
A STUDY OF BISMUTH SALTS OF GLUCONIC ACID.*

BY W. M. LAUTER AND H. A. BRAUN.[1]

Most of the bismuth preparations which have been introduced into medicine for the treatment of syphilis fall into one of the three following groups: (1) water-soluble compounds, (2) oil-soluble compounds, (3) suspensions of insoluble compounds. These groups are named in the order of decreasing rates of absorption and excretion. The choice of a bismuth prepartion depends largely upon the rapidity with which it is desired to obtain an effective bismuth concentration in the tissues and also upon the frequency of injection.

Von Oettingen, Ishikawa and Sollmann (1) have described the preparation and constitution of water-soluble mono- and di-bismuthyl citrates. Kober (2) has prepared water-soluble bismuthyl tartrates of very high bismuth content by shaking bismuth hydroxide with sodium tartrate.

Since the water-soluble bismuth salts of gluconic acid have not been described in the literature, a study of these compounds was undertaken using a method of preparation similar to that described by Kober (2). A mono-sodium-di-bismuthyl gluconate (Formula 1) and a mono-sodium-tri-bismuthyl gluconate (Formula 2) have been prepared. Also a product of still higher bismuth content was obtained which apparently is a mixture.



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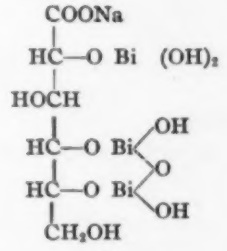

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EXPERIMENTAL.

Preparation of Sodium-Di-Bismuthyl Gluconate.—Three hundred and forty-four cubic centimeters of a bismuth subnitrate solution, prepared by dissolving 306 Gm. $BiONO_3$ in 300 cc. of concentrated HNO_3 and made up to a volume of two liters with water, are poured slowly, while cooling, into a sodium hydroxide solution containing 32 Gm. NaOH in 800 cc. H_2O. The bismuth hydroxide is filtered at once and carefully washed with water.

The still moist bismuth hydroxide is then suspended in 150 cc. of water and a solution of 12.3 Gm. of gluconic acid in 12.3 cc. of water and 2.5 Gm. NaOH is added to the suspension. The liquid becomes clear and is filtered. The volume is 225 cc. The bismuth salt is now precipitated with 225 cc. of alcohol. A sticky white mass is obtained. The supernatant liquid is decanted, the

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* Scientific Section, A. PH. A.

[1] From the Research Laboratories, The Upjohn Company, Kalamazoo, Michigan.

precipitate redissolved in 100 cc. of water and reprecipitated with the same volume of alcohol. The precipitate is again separated from the supernatant liquid and again redissolved in 150 cc. water. One hundred and fifty cubic centimeters of alcohol are added slowly and the bismuth salt is now obtained as crystals free from sodium gluconate. It is filtered, washed with 150 cc. 50 per cent alcohol, followed by 95 per cent alcohol and finally with ether. The white crystals are dried at room temperature in a vacuum desiccator. The yield was 48.5 Gm. or nearly quantitative. This material when dried to constant weight at 100° lost 9.6 per cent water of crystallization. The product dried at 100° was analyzed for bismuth by the sulphide method.

Analysis: $C_6H_{12}O_{11}NaBi_2$ (Formula 1).
Calculated: 59.55% Bi. Found: 59.63% Bi.

In aqueous solution containing 12 mg. of bismuth per cc., the p_H is 9.4. When buffered to a p_H of 8.7 the solution resists heating at 100°.

Preparation of Sodium-Tri-Bismuthyl-Gluconate.—A solution of 306 Gm. $BiONO_3$ in 300 cc. concentrated nitric acid made up to a volume of 2 liters with water is prepared.

Six hundred and eighty-eight cubic centimeters of this solution are poured carefully into a cooled solution of 64 Gm. NaOH in 1600 cc. water. The precipitated bismuth hydroxide is filtered and thoroughly washed with water. The precipitate is then resuspended in water, filtered again and washed again. It should never be allowed to become dry. The hydroxide is then suspended in 200 cc. water and shaken for 30 minutes with a solution of 20 Gm. gluconic acid in 20 cc. water and 17.2 Gm. sodium hydroxide. A slight raise of temperature can be observed. The solution is filtered. The volume is approximately 300 cc. The solution is now poured slowly, while stirring, into an equal volume of alcohol. The white precipitate is filtered. It is washed once with 300 cc. 50 per cent alcohol, followed by 95 per cent alcohol. The precipitate is then redissolved in 200 cc. water and reprecipitated with 200 cc. alcohol. This precipitate is filtered and washed with alcohol. After drying at room temperature for 16 hours in a vacuum desiccator, the yield is 64 Gm. This material when dried to constant weight at 100° lost 21.3 per cent water of crystallization. The product dried at 100° was analyzed for bismuth by the sulphide method.

Analysis: $C_6H_{12}O_{12}NaBi_3$ (Formula 2).
Calculated: 67.71% Bi. Found: 67.61% Bi.

As a check on the purity of this product a 15-Gm. portion was redissolved in 100 cc. of water and 1 drop of *N* NaOH added. The product was precipitated by adding 100 cc. of alcohol and collected by centrifuging. It was washed with 150 cc. of 50 per cent alcohol followed by 150 cc. of 95 per cent alcohol and dried in a vacuum desiccator; 8.5 Gm. were recovered. This material when dried to constant weight at 100° lost 22.6 per cent water of crystallization. The product dried at 100° was analyzed for bismuth by the sulphide method.

Analysis: $C_6H_{12}O_{12}NaBi_3$ (Formula 2).
Calculated: 67.71% Bi. Found: 67.59% Bi.

These results show that the composition of the compound is not changed by reprecipitation.

A Gluconate of Higher Bismuth Content.—Kober (2) has prepared sodium-tetra-bismuthyl tartrate by shaking sodium tartrate with bismuth hydroxide for six days. Using a similar procedure we have attempted to prepare sodium-tetra-bismuthyl gluconate.

One hundred and fifty-three grams bismuth subnitrate were dissolved in 203 cc. concentrated nitric acid and made up to a volume of 1125 cc. with water. The bismuthyl hydroxide was precipitated with 225 cc. 50 per cent NaOH solution. The hydroxide was filtered and washed. Seventeen grams gluconic acid, dissolved in 17 cc. water and 14 cc. 50 per cent NaOH solution, were shaken at room temperature for $8^1/_2$ days. The suspension was filtered and washed. An equal volume of alcohol was added to the solution and the product isolated by centrifugation and washed by centrifuging with 50 per cent alcohol, followed by 95 per cent alcohol and finally with ether. A yield of 96 Gm. was obtained.

The vacuum-desiccator-dried product lost 34.8 per cent moisture when dried to constant weight at 100°. Analysis by the sulphide method indicated 73.58 per

cent Bi. However, when this product was redissolved in water, reprecipitated with alcohol and dried to constant weight in a vacuum desiccator, it was found to contain only 6.97 per cent moisture removable by drying at 100°. The product dried at 100° analyzed 71.1 per cent Bi and was found to be insoluble in water. Thus our attempts to obtain a water-soluble tetra-bismuthyl gluconate corresponding to Kober's tetra-bismuthyl tartrate were unsuccessful.

Toxicity of the Bismuthyl Gluconates.—These preparations were dissolved in water so that each cc. contained 12 mg. of metallic bismuth and injected intravenously in rats. This route of administration is not used clinically but has been employed by a number of laboratory workers for rapidly estimating the systemic toxicity of various water-soluble bismuth compounds.

Preliminary experiments seemed to indicate that the tri-bismuthyl gluconate was somewhat less toxic than the di-bismuthyl gluconate. However, more complete studies using a large number of rats indicated that all these gluconates are approximately equally toxic. The minimum fatal dose was found to be approximately 7 mg. of bismuth metal per kilo and death occurred on the second to fifth day after injection. Parallel injections of water-soluble citrates and tartrates gave results indicating a similar toxicity.

These results indicate that these various water-soluble bismuth preparations when injected intravenously in rats in equivalent doses of metallic bismuth are approximately equally toxic. The wide differences in the intramuscular toxicities of numerous water-soluble bismuth preparations reported from the literature by Hanzlik, Seidenfeld and Johnson (3) are probably due in large part to differences in rates of absorption from the muscle. When such preparations are injected intravenously the factor of absorption is not introduced and the toxicities are greater and show lesser individual variation.

SUMMARY.

A mono-sodium-di-bismuthyl gluconate and a mono-sodium-tri-bismuthyl gluconate have been prepared containing 59.6 per cent and 67.6 per cent bismuth, respectively. When injected intravenously in aqueous solution into rats these compounds show a minimum fatal dose of approximately 7 mg. of metallic bismuth per Kg. which agrees with a similar toxicity observed for some water-soluble tartrates and citrates which were injected in parallel groups of rats.

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MERCURY DERIVATIVES OF AZO DYES.*,[1]

BY W. BRAKER AND W. G. CHRISTIANSEN.

Azo dyes such as the hydrochloride of 2,4-diamino-4′-ethoxy azobenzene (compound I)

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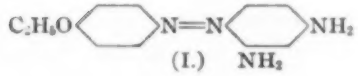
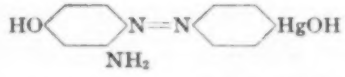
* Scientific Section, A. PH. A., Portland meeting, 1935.

[1] Research Department of the Chemical and Pharmaceutical Laboratories, E. R. Squibb and Sons, Brooklyn, N. Y.

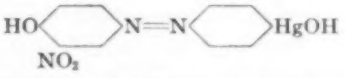


(I.)

are used as antiseptics in the treatment of infections of the urinary tract. While investigating dyes more or less closely related to the above it was considered of interest to prepare several examples having an hydroxy-mercuri group attached to one of the benzene nuclei. It was realized that such compounds might be unsuitable for use owing to low solubility and that the only ones which could be expected to be suitable for practical use would have salt-forming groups such as phenolic hydroxyls. Since nitro phenols are more acidic than the unnitrated phenols, a compound containing a nitro group as well as an hydroxyl group was included. Two compounds of this type were prepared; they were, however, insoluble even in excess alkali hydroxide and therefore of no practical interest. The substances were:



4-Hydroxymercuri-2′-amino-4′-hydroxy azobenzene.



4-Hydroxymercuri-3′-nitro-4′-hydroxy azobenzene.

Attempts to prepare compounds with still more acidic substituents such as carboxyl and sulphonic acid groups resulted in numerous difficulties such as internal salt formation.

EXPERIMENTAL.

Preparation of Para-Amino Phenyl Mercury Acetate.—This substance was prepared according to the method described by Whitmore.[1] A white crystalline material of melting point 166–167° C. was obtained.

Preparation of 4-Hydroxymercuri-2′-Amino-4′-Hydroxy Azobenzene.—10.2 Gm. of para-amino phenyl mercury acetate was dissolved in 25 cc. of concentrated hydrochloric acid contained in 125 cc. of water. The substance was diazotized with 2.0 Gm. of sodium nitrite. The excess nitrous acid was eliminated by the addition of 0.5 Gm. of urea. A solution of 3.1 Gm. of meta-amino phenol in 100 cc. of 15% sodium hydroxide was added at 0° C. The mixture was stirred at 0° C. for one hour and at 26° C. for three hours. The mixture was then acidified with dilute acetic acid and the dark red flocculent precipitate was filtered off, washed with water and dried *in vacuo*.

Yield, 3.75 Gm. of a dark red powder.

Assay.—Mercury: Found, 47.07%; calculated for $C_{12}H_{11}N_2O_2Hg$, 46.69%.

Preparation of 4-Hydroxymercuri-3′-Nitro-4′-Hydroxy Azobenzene.—10.5 Gm. of para-amino phenyl mercury acetate contained in dilute hydrochloric acid was diazotized with 2.5 Gm. of sodium nitrite. The excess nitrous acid was destroyed by the addition of 1.0 Gm. of urea. 4.5 Gm. of ortho-nitrophenol dissolved in 100 cc. of 10% sodium hydroxide solution was then added at 0° C. The mixture was further stirred for two hours at 0° C. and allowed to remain over night at 25° C. A yellow crystalline material insoluble in this alkaline medium was filtered off, washed with water and dried *in vacuo*. This material was shown by assay to be 4-hydroxymercuri-3′-nitro-4′-hydroxy azobenzene. The filtrate of the latter was made slightly acid with hydrochloric acid and the brown precipitate thus obtained was filtered off, washed with water and dried *in vacuo*.

[1] Whitmore, "Organic Compounds of Mercury," 210 (1921).

This material was identified by assay as *p*-hydroxymercury aniline. Evidently the diazotization had been only partially completed prior to the coupling reaction.

Yield, 2.1 Gm. of a yellow crystalline material.

Assay.—Mercury: Found, 43.25%; calculated for $C_{12}H_9O_4N_2Hg$, 43.65%.

SUMMARY.

Hydroxymercury derivatives of azo dyes frequently used as urinary antiseptics have been prepared but have been found to be too insoluble for biological testing.

MISCELLANEOUS DERIVATIVES OF 8-HYDROXY-QUINOLINE.*

BY E. MONESS AND W. G. CHRISTIANSEN.[1]

The alkylation of phenolic germicides frequently increases the activity of the compound. We therefore introduced the propyl group into chloro-8-hydroxy-quinoline. To this end we prepared 5-propyl-8-hydroxy-quinoline and chlorinated it to form 5-propyl-7-chloro-8-hydroxy-quinoline. This compound was incorporated into an oily medium and evaluated by the agar cup-plate method (1). It was found to be less active than the non-alkylated compound, giving a clear zone of only 1–2 mm., whereas chloro-8-hydroxy-quinoline, tested simultaneously with it, showed a 5-mm. clear zone. It is reasonable to believe that a lowered water-solubility, brought about by alkylation, is the reason for its lesser activity.

While 5-chloro-8-hydroxy-quinoline is soluble in oily vehicles, and in such media is a valuable germicide, its usefulness is limited by its insolubility in aqueous solutions. An attempt was therefore made to render it water-soluble by preparing its metho-chloride. When prepared, this compound (analogous to the metho-chloride of acridine) was readily soluble in water, but its activity was found to be considerably less than that of the original chlorohydroxy quinoline.

Two mercury derivatives of 8-hydroxy-quinoline: anhydro-mercuri-5-chloro-8-hydroxy-quinoline and anhydro-mercuri-5-nitro-8-hydroxy-quinoline, were prepared for evaluation as germicides. They were obtained as orange-colored, microcrystalline powders, but were found to be insoluble in dilute alkali, and therefore were not tested for activity.

Since the quinoline nucleus is present in certain parasiticides of the quinoline type, we used hydroxy-quinoline as an intermediate in the preparation of two compounds which seemed to offer possibilities of such activity. 5-(Diethylaminoethylamino)-8-hydroxy-quinoline and 8-diethylaminoethoxy-quinoline were prepared and tested as trypanocides. The former showed practically no activity, and the latter, while definitely active, was inferior to other well-known trypanocidal agents.

It was thought possible to obtain derivatives of hydroxy-quinoline which would possess local anesthetic properties, and as an example we prepared the diethylaminoethyl ester of 5-carboxy-8-ethoxy-quinoline. In this synthesis we followed the method used by Matsumura (2) in the preparation of 5-carboxy-8-hydroxy-

* Scientific Section, A. PH. A., Portland meeting, 1935.

[1] Research Department of the Chemical and Pharmaceutical Laboratories, E. R. Squibb and Sons, Brooklyn, N. Y.

quinoline. Since we desired the ethoxy compound rather than the hydroxy, we ethylated the 5-benzoyl-8-hydroxy-quinoline before converting to the oxime. Our diethylaminoethyl ester was obtained by reacting the sodium salt of the acid with diethylaminoethyl chloride. We confirmed the structure of the final compound by preparing it by the Skraup reaction, using methyl-3-amino-4-ethoxy benzoate as the starting material. A mixed melting point proved the two end products to be identical. When tested as a local anesthetic, the compound was found to be only slightly active.

EXPERIMENTAL.

Preparation of 2-Nitro-p-Propyl-Phenol (3).—Forty grams *p*-propyl-phenol were dissolved in 80 Gm. benzene, to which solution was added, dropwise, 96 Gm. of a mixture of equal volumes of concentrated nitric acid and water, stirring constantly and keeping the reaction mixture cooled to 15–20° C. The nitric acid layer was drained off, and the benzene solution was washed with water. The benzene was distilled off and the residual oil steam-distilled. The yellow oil obtained was extracted with ether, the latter distilled off and the oil fractionated.

Yield—29 Gm. of yellow oil; b. p. 110° C. at 4 mm.

Analysis: Found—N, 7.52%; calculated for $C_9H_{11}O_3N$—N, 7.74%.

The analysis by the Kjeldahl method was preceded by reduction with hydrosulphite. The 0.15-Gm. sample in a Kjeldahl flask was dissolved in 5 cc. normal sodium hydroxide and 0.5–1.0 Gm. of sodium hydrosulphite was added. After a few minutes of gentle heating the red solution was decolorized and yellowish white crystals separated. The usual Kjeldahl procedure was then followed.

Preparation of 2-Amino-p-Propyl-Phenol.—Ten grams 2-nitro-*p*-propyl-phenol were dissolved in 250 cc. of approximately normal sodium hydroxide, and while heating on a steam-bath, powdered sodium hydrosulphite was added in small portions until the red color had disappeared. The mass of silvery gray crystals which separated was filtered off and washed with water.

Yield—4.8 Gm., m. p. 140–142° C.

Analysis: Found—N, 9.17%; calculated for $C_9H_{13}ON$—N, 9.27%.

Preparation of 5-Propyl-8-Hydroxy-Quinoline.—Four and five-tenths grams 2-amino-*p*-propyl-phenol were mixed with 6.8 Gm. arsenic pentoxide and 13.5 Gm. glycerin. Thirteen and five-tenths grams of concentrated sulphuric acid were added and the mixture, heated by means of an oil-bath, was boiled under reflux for four hours. It was then cooled and diluted with water. The brown residue was filtered off and washed with water. The filtrate was neutralized with dilute sodium bicarbonate solution and 2.5 Gm. of a brown, slightly tarry substance was obtained. The original residue was boiled with three successive 100-cc. portions of 5% sulphuric acid, and these combined extracts were neutralized with sodium bicarbonate solution. Five-tenths gram of crude product was thus recovered, combined with that obtained from the original solution, and the whole dissolved in boiling alcohol. A slight insoluble residue was filtered off, and the filtrate acidified with alcoholic hydrochloric acid. The clear red solution was evaporated to dryness, the residue dissolved in water, treated with charcoal and filtered. To the bright yellow filtrate was added a solution of sodium acetate, precipitating the base.

Yield—1.5 Gm. of a grayish yellow powder; m. p. 52–52.5° C.

Analysis: The Kjeldahl method for nitrogen failed, and the Dumas method was useless since the substance exploded. Explosion followed an attempt at a carbon-hydrogen analysis. It was decided, therefore, to characterize the compound after chlorination.

Preparation of 5-Propyl-7-Chloro-8-Hydroxy-Quinoline.—Five-tenths gram 5-propyl-8-hydroxy-quinoline was dissolved in 10 cc. glacial acetic acid and mixed with 2 cc. (a large excess) of sulphuryl chloride. The mixture was heated on the steam-bath, under reflux, for one hour. It was then poured into water and the milky solution neutralized with ammonium hydroxide. The yellow substance obtained weighed 0.43 Gm. and was shown by analysis to be a mixture of the mono-chloro compound and its hydrochloride. It was dissolved in alcoholic hydrochloric acid and precipitated as the hydrochloride by means of anhydrous ether. The resulting yellow powder melted at 242° C. with decomposition.

Analysis: Found—Cl, 27.52%; calculated for $C_{12}H_{12}ONCl.HCl$—Cl, 27.52%.

The hydrochloride was hydrolyzed by boiling with water and neutralizing with sodium bicarbonate. The base so obtained was analyzed for chlorine.

Analysis: Found—Cl, 15.97%; calculated for $C_{12}H_{12}ONCl$—Cl, 16.03%.

Preparation of the Metho-Chloride of 5-Chloro-8-Hydroxy-Quinoline.—Four grams 5-chloro-8-hydroxy-quinoline were dissolved in 100 cc. nitrobenzene (4) and heated on an oil-bath with 4 Gm. dimethyl sulphate for one hour at ca. 190° C. No crystals formed on cooling. The nitrobenzene was removed by steam-distillation, and the aqueous solution distilled to small volume, acidified with hydrochloric acid and saturated with sodium chloride. A precipitate appeared and was redissolved by heating. On cooling, the substance crystallized out and was filtered off, redissolved in alcohol and the solution filtered from a small insoluble residue. To the clear solution was added twice its volume of anhydrous ether, precipitating the desired compound.

Yield—2 Gm. of a brilliant yellow substance.

Analysis: Found—Cl, 27.55%; calculated for $C_{10}H_9ONCl_2$—Cl, 30.85%; for the corresponding methyl sulphate—Cl, 10.35%.

The substance was therefore judged to be a mixture of 83.9% of the metho-chloride of 5-chloro-8-hydroxy-quinoline, and 16.1% of its methyl sulphate.

Preparation of 8-Diethylaminoethoxy-Quinoline Dihydrochloride.—Forty-six hundredths gram of sodium was dissolved in 20 cc. absolute alcohol and 1.45 Gm. 8-hydroxy-quinoline added. The sodium salt which formed did not completely dissolve. Two and six-tenths grams diethylaminoethyl bromide hydrobromide, dissolved in 20 cc. absolute alcohol, were added, effecting complete solution of the sodium salt.

The mixture was refluxed for eight hours and was then filtered off from the separated sodium bromide. The alcohol was distilled off and the dark red residue dissolved in water. It was then made alkaline with dilute caustic soda solution, and an oily emulsion was obtained, which was steam distilled to remove any unreacted diethylaminoethyl bromide. The oil was extracted with ether, and dry hydrochloric acid gas was passed into the dry ether extract. A reddish oil separated out. The ether was decanted off, the oily hydrochloride washed once by decantation with ether, and dissolved in water. The aqueous solution was boiled with charcoal, filtered and evaporated to dryness. The light yellow oil which remained partially crystallized on standing over night.

Yield—1 Gm.

Analysis: Found—Cl, 22.62%; calculated for $C_{15}H_{20}ON_2.2HCl$—Cl, 22.40%.

Preparation of 5-(Diethylaminoethylamino)-8-Hydroxy-Quinoline Dihydrochloride.—Five grams 5-amino-8-hydroxy-quinoline was suspended in 20 cc. dry benzene. To this was added a solution of 4.6 Gm. diethylaminoethyl chloride in 10 cc. benzol. The mixture was refluxed on a steam-bath for seven hours. The benzene was decanted from the condensation product which had formed a dark viscous mass at the bottom of the flask. The mass was washed twice by decantation with benzol, and after expelling all benzol by heating on the steam-bath, was dissolved in water. A dark brown residue, filtered off from the red solution, was found to be unreacted 5-amino-8-hydroxy-quinoline. The aqueous solution was made alkaline with sodium carbonate, producing a dark, somewhat tarry precipitate. After steam distillation, to remove any unreacted diethylaminoethyl chloride, it was extracted with ether, the ether solution dried over anhydrous sodium sulphate and treated with charcoal. Dry hydrochloric acid gas was conducted into the light brown solution, throwing down a flocculent brown precipitate, from which the ether was decanted. The residue was washed by decantation with ether, dried and heated at 100° C. for two hours. The violet-colored substance was seen to be crystalline.

Analysis: Found—Cl, 21.58%; calculated for $C_{15}H_{21}ON_3.2HCl$—Cl, 21.38%.

Preparation of 5-Carboxy-8-Ethoxy-Quinoline by the Skraup Reaction.—Five grams methyl-3-amino-4-ethoxy benzoate were mixed with 7.5 Gm. arsenic pentoxide and 15 Gm. glycerin. Fifteen grams concentrated sulphuric acid were added and the mixture refluxed in an oil-bath for four hours at 140–150° C. The dark reaction mixture was cooled and shaken with 60 cc. water. The brown solution was filtered from a dark residue.

The filtrate was nearly neutralized with ammonia, and then treated with a solution of sodium acetate. The greenish precipitate obtained was filtered off and washed with water. It was redissolved in alcohol and treated with 0.5 cc. of concentrated sulphuric acid. On adding four volumes of ether to this solution, a brownish gray precipitate of the sulphate of 5-carboxy-8-ethoxy-

quinoline was obtained. It was filtered off and washed with ether. The dry substance weighed 1.3 Gm.

The dark residue from the original filtrate was extracted three times with 100-cc. portions of boiling 10% sulphuric acid. The three extracts were combined and evaporated to a small volume. The gray crystals which separated and were filtered have not yet been identified. The filtrate from this substance was nearly neutralized with ammonia and precipitated by the addition of sodium acetate solution. The greenish precipitate obtained was isolated, dissolved in alcohol, treated with a little sulphuric acid and precipitated as the sulphate by means of ether. It weighed 1.1 Gm.

The two crops of the sulphate of 5-carboxy-8-ethoxy-quinoline, weighing 2.4 Gm., were dissolved in water and purified by shaking with charcoal. After filtering it was treated with sodium acetate and a greenish gray substance was obtained weighing 1.5 Gm., m. p. 285° C. The melting point of the 5-carboxy-8-ethoxy-quinoline prepared previously by the method of Matsumura was 292° C. The mixed melting point of the two substances was found to be 292° C.

Preparation of the Diethylaminoethyl Ester of 5-Carboxy-8-Ethoxy-Quinoline.—The sodium salt of the acid was first prepared by dissolving 1.8 Gm. of the acid in 8.4 cc. of normal sodium hydroxide. This solution was evaporated to dryness on the steam-bath, and taken up in 70 cc. of absolute alcohol. After refluxing on the steam-bath for two hours almost all of the substance dissolved. To this boiling solution was added 3 Gm. of diethylaminoethyl chloride (a large excess) dissolved in 25 cc. of absolute alcohol. The refluxing was continued for nine hours and sodium chloride was seen to have separated out. The alcohol was distilled off, and the excess of diethylaminoethyl chloride was distilled off in high vacuo on the steam-bath. The resulting brown viscous substance was shaken vigorously with water and a silvery gray precipitate was obtained. It was filtered off, washed and dried. It weighed 1.1 Gm. and had a m. p. of 76° C. It was redissolved in alcohol, and the dark solution was shaken with charcoal. On filtering, a clear yellow solution was obtained, which on evaporation to dryness gave a grayish white substance melting at 86° C.

Analysis: Found—N, 9.44%; calculated for $C_{15}H_{24}O_3N_2$—N, 8.86%.

It is possible that not all of the diethylaminoethyl chloride had been removed from the viscous material. In view of the small amount on hand, and because of the absence of local anesthetic activity in this substance, the further purification of the compound has not been undertaken.

Preparation of Anhydro-Mercuri-5-Chloro-8-Hydroxy-Quinoline.—One and five-tenths grams 5-chloro-8-hydroxy-quinoline were dissolved, on the steam-bath, in 20 cc. of absolute alcohol. To the solution was added 2.66 Gm. of mercuric acetate dissolved in 8 cc. of water which had been slightly acidified with acetic acid. An orange precipitate appeared at once. The mixture was refluxed for five hours, at the end of which time a test for Hg^{++} with ammonium sulphide was negative. The orange compound was filtered off, and washed with water. It was then boiled with alcohol, filtered off and dried. It was almost completely insoluble in dilute alkali.

Yield—2.1 Gm. of an orange powder.

Analysis: Found—Hg, 53.7%; calculated for $C_9H_4ONHgCl$—Hg, 52.9%.

Preparation of Anhydro-Mercuri-5-Nitro-8-Hydroxy-Quinoline.—This substance was prepared in the same manner as the chloro compound above. It is also an orange powder, only slightly soluble in dilute alkali.

Analysis: Found—Hg, 49.4%; calculated for $C_9H_4O_3N_2Hg$—Hg, 51.5%.

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THE ALKALOIDAL CONTENT OF OREGON-GROWN CYTISUS SCOPARIUS.*,[1]

BY F. A. GILFILLAN[2] AND FELIPE PATRICIO LOGAN.

Cytisus scoparius L., or Scotch broom, has an ancient and honorable medical history. In early times, it spread from its home in the Ural mountains, across northern and western Europe. We find it mentioned in early German and Italian herbals, also in the first Pharmacopœia of London, published in 1618. It was included in all editions of the U. S. Pharmacopœia from 1840 to 1900 with the exception of the revision of 1850, and it is still listed in the N. F. Its chief alkaloid, sparteine, was official in the form of the sulphate in U. S. P. IX. Historically, as the "planta genista" it was worn on the helmet of Geoffrey of Anjou, from whom were descended the "Plantagenet" kings who ruled Great Britain for several hundred years.

Sparteine, the prime alkaloid in the plant, was discovered by Stenhouse (11) in 1851, but the determination of its constitution presented problems which have engaged the attention of organic chemists almost continuously since that time (14, 9, 15, 13, 6). Two other alkaloids, sarothamine and genisteine, were discovered in this plant (10) in 1918, but their amount is negligible. The quantitative determination of the alkaloids of Scotch broom has offered some difficulty. Gravimetric methods have been favored by many investigators (2, 3, 4, 5); however, volumetric methods have been used (1, 7, 8, 12), sometimes with questionable results (5). Seasonal variations in the alkaloidal content of the root of this plant were investigated by Chevalier (3) who found the maximum in March, the minimum in August.

EXPERIMENTAL.

Indicators for Sparteine.—A $N/20$ solution of sparteine sulphate, U. S. P. IX was made, using 2.112 Gm. in 100 cc., then 10-cc. aliquots of this were made alkaline with ammonia, extracted with chloroform, filtered and evaporated. The residues which should have consisted of 0.11715 Gm. of sparteine varied in weight from 0.1105 Gm. to 0.1168 Gm. When these residues were titrated in duplicate with the several indicators, the following percentages were obtained, based on the actual weight of each residue used: methyl red (97.22%), hematoxylin (91.96%), cochineal (91.26%), phenolphthalein (67.90%) and bromthymol blue (63.14%).

In order to eliminate errors arising from possible impurities in the original sparteine sulphate, or from loss of alkaloid during evaporation of the solvent, or from residual ammonia in the titration sample, it was decided to try these indicators using pure sparteine. Into a 500-cc. Claissen flask were placed 173.91 Gm. of sparteine sulphate, a little water and the calculated amount of sodium hydroxide, 32.918 Gm. This mixture was distilled under 18 mm. pressure and the liquid alkaloid so obtained, after drying over KOH, was fractionated at 18 mm. pressure. Fraction I (180–183° C.) = 15.39 Gm.: Fraction II (183–185° C.) = 23.40 Gm.: Fraction III (185–188° C.) = 18.43 Gm.: Fraction IV (188–190° C.) = 17.20 Gm. From Fraction III, which was assumed to be pure, 1.0549 Gm. of the alkaloid was dissolved in a standard solution of $N/50$ sulphuric acid contained in a 500-cc. volumetric flask, and made up to volume. From this were used 25-cc. aliquots, in each of which the excess acid was determined, using the different indicators. Three titrations were made with each indicator, the averages being: methyl red (99.64%), hematoxylin (99.22%), cochineal (98.82%), bromthymol blue (98.34%) and phenolphthalein (94.88%).

* Scientific Section, A. PH. A., Portland meeting, 1935.

[1] Based on a thesis by Felipe Patricio Logan, presented in partial fulfilment of the requirements for the degree of Master of Science at the Oregon State College.

[2] Professor of Pharmacy, Oregon State College.

Analysis of Crude Drug.—Monthly collections, from January to June, were made of broom tops growing wild near Corvallis. Those growing in the shade were kept separate from those in full sun. All were air-dried and ground, rejecting the larger stems. Two extraction methods were tried, using 60% alcohol in one case, and 1% sulphuric acid in the other. With Kg. samples of drug, results showed a slightly greater efficiency when the acid was used.

Moisture determinations were made on the air-dried drug collected each month, but the results were without significance. Ash determinations on the same monthly samples showed erratic variations. The alkaloidal content, however, showed a regular seasonal variation. A total of 31 gravimetric and 31 volumetric determinations were made on the 10 samples collected from January to June. The averages of these results, based on moisture-free drug, follows:

	Gravimetric.	Volumetric.
January	0.986%	0.980%
February	1.000	0.966
March	1.031	1.026
April	0.907	0.898
May	0.873	0.863
June	1.030 (?)	0.930

Additional samples, growing in full sun and in shade, collected in January and in April, showed the same results as the composite samples listed above.

SUMMARY AND CONCLUSIONS.

1. Sparteine is monoacidic to most indicators. Methyl red is quite satisfactory, phenolphthalein invariably gives low results, while hematoxylin, cochineal or bromthymol blue give good results in the absence of interfering impurities.

2. In analyses where extraction is used, volumetric results are apt to be slightly lower than gravimetric, probably due to loss of free alkaloid during volatilization of the solvent.

3. The total alkaloid content of Scotch broom tops, calculated as pure sparteine, reached, between January and June, a maximum of somewhat over 1% in March, declined, and then increased again slightly in June.

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Section Officers and Contributors to the Sections will note the approach of time for the meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION.

MORPHOLOGICAL STUDIES ON POLYGALA SENEGA.*,[1]

BY PAUL D. CARPENTER.

Senega, the root of a small North American plant, Polygala Senega L., enjoyed a very early reputation as one of the new remedies produced by America. It has been official in every edition of the United States Pharmacopœia since 1820. The root is of considerable interest pharmacognostically because of the wide variation evidenced in its secondary development. It has been the object of this work to make a detailed study of this variation histologically, correlating with it certain evident macroscopical irregularities consistently observed in the root.

The Drug.

(A) DESCRIPTION OF THE FRESH ROOT.

The fresh roots of Senega are light yellow in color. They may occasionally attain a length of 20 cm. but for the most part they average about 10 to 15 cm. The main root just below the crown soon breaks up into two or more large roots which in turn freely branch producing many fine ramifications.

The main root near the crown is about 1 cm. in diameter in plants of 5 years or more and correspondingly smaller in younger plants.

The roots rarely grow straight but are more or less curved and "knotty."

There are two characteristic markings or formations in the fresh root. First, the larger roots are knurled or marked with cross lines. The lines are formed because of regions of lesser and greater diameter in the root which give rise to a series of bulges. They vary in size (longitudinal) from about 1 mm. to 10 mm. They are very pronounced on one side of the root and gradually diminish until on the opposite side they are completely lost, which gives rise to the second characteristic marking, a narrow slightly raised and smooth ridge running through the length of the larger roots. This ridge may be quite straight, or it may form in a long spiral around the root. It is at this area a prominent keel forms upon drying.

Transverse sections of the fresh root are usually widely ovate in shape. The keel subsequently appears at the narrow end.

(B) MACROSCOPICAL DESCRIPTION OF DRUG.

The drug occurs nearly entire with some of the larger roots as long as 15 cm. The average length is between 7 and 10 cm. and 2.0 to 10 mm. in diameter. They are branched and slenderly conical. Most of the smaller roots are broken off either in collecting or in drying and handling. The rather large knotty crowns (2–3 cm. in diameter) are included with the roots. The crown is composed largely of stem bases and numerous rose-tinted or purplish buds which give to the crown, as a whole, a decided rose or purplish color.

The larger roots are often curved and twisted. The twist is long, perhaps 180° or so in a root 10 cm. long. On the larger roots a characteristic raised ridge, running longitudinally and more or less spiral, following the twisting of the root, is frequently developed. It may be more pronounced on some roots than on others although there is some indication of it on all of the larger roots (3 mm. or more in diameter) and occasionally on some of the smaller ones. This ridge is called the keel. The keel forms upon drying and develops along that part of the root free from cross wrinkles (knurls) (Figs. 5, 6).

The knurls are less pronounced after drying than before but are nevertheless readily dis-

* Scientific Section, A. Ph. A., Portland meeting, 1935.

[1] Part of a Thesis submitted in partial fulfilment of the requirements for the degree of Master of Science in the Graduate School in the University of Illinois.

Fig. 1.—*Polygala Senega.*—Transverse section of the root showing concentrate rings in the phloem.

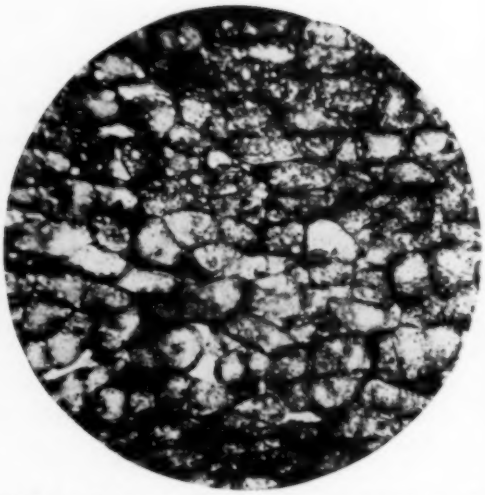


Fig. 2.—*Polygala Senega.*—Photomicrograph of cortex. Note indication of cell division throughout this region.

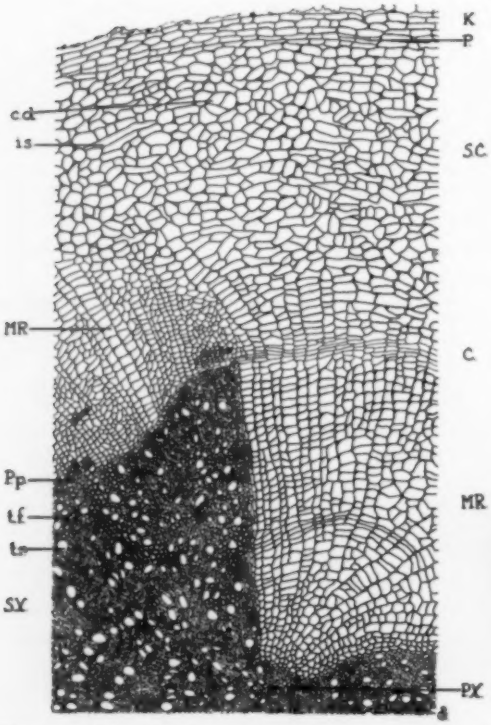


Fig. 3.—*Polygala Senega.*—Transverse section of the root.

K.—cork
P.—phellogen
c.d.—cells indicative of cell division
i.s.—intercellular space
S.C.—secondary cortex
C.—cambium
M.R.—medullary rays
M.R.—medullary ray (board medullary ray of the xylem)
P.p.—"phloem patch," sieve tissue
t.f.—fibre tracheids
tr.—tracheal tubes
S.X.—secondary xylem
P.X.—primary xylem

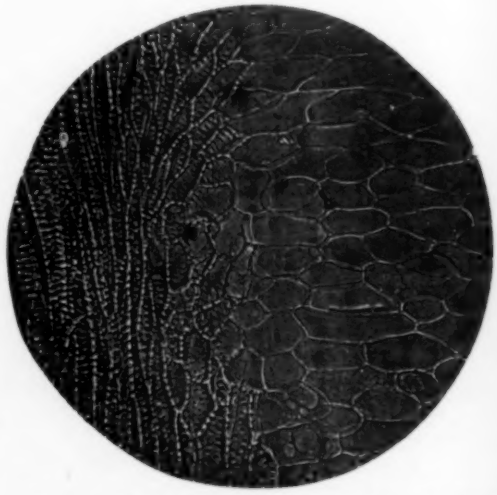


Fig. 4.—Photomicrograph of radial longitudinal section through the juncture of the parenchyma wedge and lignified portion of the xylem.

tinguishable in the drug. Most of the roots develop narrow and shallow longitudinal furrows after drying.

The color is brownish yellow, much darker than in the fresh root. The fracture is short. The drug has a peculiar and penetrating odor and a sweetish taste, afterward becoming acrid. In recently dried roots, or in those packed in tightly closed containers, there is a distinct odor of methyl salicylate which, however, disappears upon short exposure to the air.

(c) HISTOLOGICAL STUDIES.

1. Lens View (T.S.).—It would be impossible to describe all of the varied formations found in transverse sections of Senega root. Even to describe a "typical section" would be difficult, for there are no two alike and sections cut a few microns apart may show extreme differences (Fig. 7).

A description of a transverse section follows which in the main is often met with and may, with some flexibility, be called typical and at the same time comments will be made in general (Fig. 1).

The bark varies in thickness considerably, from 1 mm. at its narrowest point to 2.25 mm, at the widest. The xylem is eccentric and 2.3 mm. in diameter. The lignified tissue is broken by a wide medullary ray, where adjacent to the cambium it is 1.7 mm. wide and wedge shaped running to the primary xylem. The ray is only 0.8 mm. deep, thus the primary xylem is eccentric and more secondary growth is on that side opposite the wide medullary ray. In this specimen, it is 1.5 mm. thick.

The bark is easily differentiated into three regions. *First*, the cork which in unstained specimens appears as a narrow yellowish brown line, encircling the root. In stained specimens it usually takes up more of the stain than any of the other tissues and is then distinctly seen as a very dark line corresponding in color to the stain used.

Second, the cortex which is a narrow, light yellow region just inside the cork. It varies greatly in thickness, being thickest adjacent to the wide medullary ray. In this specimen it is 1 mm. It becomes gradually diminished in thickness until on the opposite side it may be only a few cells thick and hardly visible in this view. There is no apparent differentiation in the cells and the cortex appears homogeneous throughout.

Third, the phloem is well differentiated from the other bark regions. In the unstained specimen, it is of a somewhat darker yellow color than the cortex. In stained specimens, both regions stain equally. The phloem, however, is easily differentiated after slight magnification because of the regularity of its cells which give rise to two distinct groups of lines. *First*, medullary rays can be seen distinctly as fine lines running from the cambium out to the cortex. These rays, however, are not all straight, or radial, nor do they form all around the bark if a large medullary ray is present in the xylem as in the section being described. There are no rays opposite and adjacent to the cambium directly over the wide parenchyma wedge of the xylem (this ray does not usually continue into the bark as will be shown under the microscopic description). Near the tangential extremities of the wedge, that is away from the middle, short-curved medullary rays are plainly visible in the phloem. Farther away and approaching the opposite side of the root, the rays become very much curved and longer until directly opposite the wedge they begin to straighten out and are finally quite radial. At this region the phloem is very wide (2.25 mm.). It is here the keel forms.

The second group of lines seen in the phloem are concentric circles, especially distinct in the thicker regions, where in the specimen under discussion, there are some 12 to 14 lines. The lines closer to the cork are farther apart and they gradually become closer together until near the cambium they are only a fraction of a millimeter apart. These concentric circles of the phloem will be further discussed under the microscopic description.

THE XYLEM.

It is in the xylem region that extreme variations are seen in the lignified portion. As already mentioned the xylem is invariably eccentrically located in the

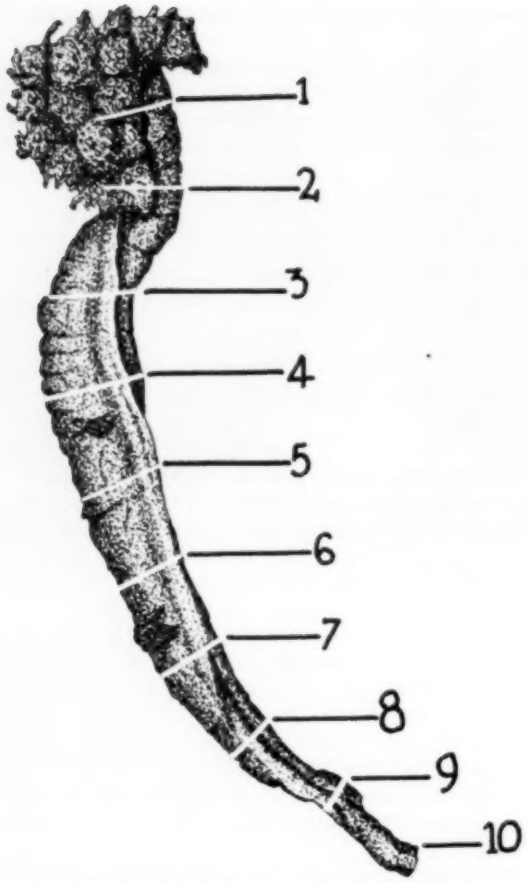


Fig. 5.—*Polygala Senega.*—Root from which transverse sections of Fig. 7 were cut at the various regions indicated by numbers 1 to 10.

Fig. 6.—*Polygala Senega.*—Root from which model of xylem was made. The length of the root was 5 cm.

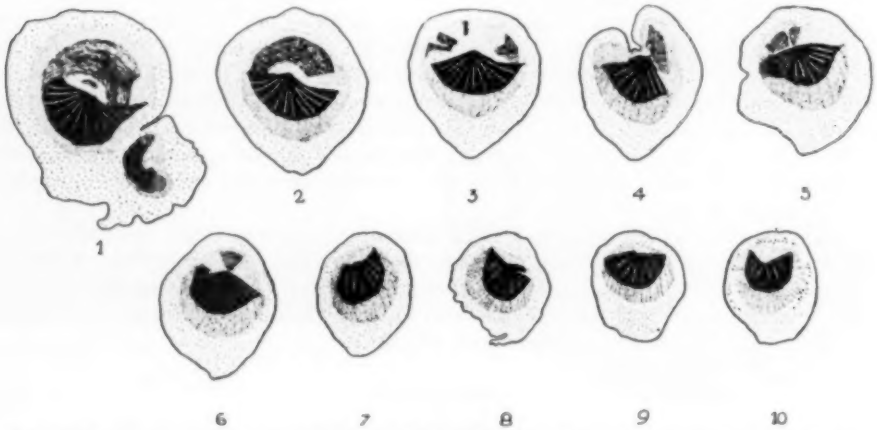
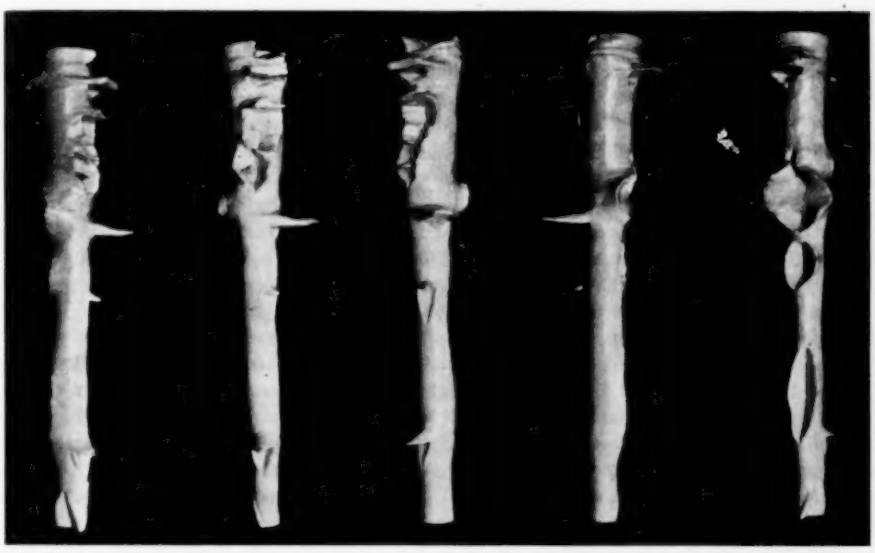


Fig. 7.—Transverse sections showing variations in the xylem of the root shown in Fig. 5, cut at the corresponding numbers.



0° 45° 90° 180° 270°

Fig. 8.—Photographs of model rotated through degrees indicated to show all sides.

root and it in itself is eccentrically formed, that is, the primary xylem is seldom in the geometric center. Even when it, as a whole, appears almost circular, it is found to have much more secondary development on one side than on the other. More growth is found on the same side as the greatest development in the phloem, or if a wedge of parenchyma is present on the opposite side to this. The lignified portion may vary from what appears to be a normal xylem (circular in transverse section) to a very small and irregular V-shaped xylem (Fig. 7). It is pointed out here that in practically all roots studied, the xylem as a whole is circular in transverse view. By definition the xylem of a root is all tissue "produced by the cambium and found inside of, and surrounded by the cambium." This then takes in the wide areas of parenchyma already referred to as wide medullary rays or parenchyma wedges. In most of the works on Senega, the term xylem has been loosely used to mean only the lignified portion of the entire xylem. Even in sections showing a V-shaped lignified area, the cambium can often be seen to form a circle in transverse section.

The cells of the wide parenchyma wedges of the xylem are in radial rows. By location, by origin, by arrangement of cells, by shape, these wedges of parenchyma are medullary rays definitely belonging to the xylem. The marked variation in the xylem, then, is not in it as a whole, but in the lignified portion of it, or which amounts to the same thing, wide variations in the medullary rays of this region. It is, however, convenient to use the term xylem to mean the lignified portion only and it will be used in this way except in specific instances where reference will be made to its more exact usage.

In an unstained specimen the lignified portion of the xylem is of a very pale yellow color, almost white in comparison to the bark. The various shapes may readily be observed in even the small roots by cutting transversely and examining the cut surface with a hand lens, or in the larger roots with the unaided eye.

Annual rings may be seen in sections either stained, or unstained, at a magnification of about 5 ×, showing much better at this mangification than under the higher power of the micro-

scope. They appear as faint concentric lines especially well, if oblique light falls on the section. In the particular specimen used in the discussion so far, there were five such rings apparent, indicating the root is six years old. Very fine but distinctly seen radial lines, some straight, some slightly curved, are seen as narrow medullary rays in the xylem. There were about twenty-four in this specimen (they are more prominent toward the outer half of the xylem). The radial arrangement of the cells in the wide medullary ray can be plainly seen, especially in contrast to the cortical cells farther out.

2. Microscopical Description. The Bark—the Cork.—The cork layer of Senega root is relatively thin, seldom over 4 or 5 cells thick except in an occasional area of wound cork where it is thicker (10–20 cells) and in a few instances it has been noted that these cells are lignified.

In transverse section the cork cells appear oval to rectangular for the most part, but as this region approaches that portion of the root opposite the wide medullary ray, the cells tend to become more and more isodiametric and often appear almost round in this view.

The average size of the cork cells in transverse section is about 60 microns (tangential diameter) by 20 microns (radial diameter) although there is considerable variation from these sizes, especially in the tangential diameter. The cell wall is quite thin (1–2 microns) with only slight variations in thickness. In longitudinal radial view the cells appear more square and average about 20 x 30 microns with the radial diameter shorter than the tangential. In longitudinal tangential (surface) view, the average size is 20 x 60 microns, the cells being elongated tangentially. The middle lamella is not apparent in any of the sections.

The cork cells of Senega root do not form in the characteristic radial rows usually observed in most dicotyl corks. The cork appears rather as a layer of suberized parenchyma. Very often the outermost layer of cells (whole cells) shows protoplasts, again suggesting a resemblance to parenchyma. The cell walls are a light yellow color, the outer wall of the outermost cells slightly darker. There are partially disintegrated or decayed cells similar to the cork cells adhering as uneven broken fragments on the outer surface. Possibly these are old primary cells but because of their close resemblance to the cork cells just described, they are probably of the same tissue.

Phellogen.—Evidence of a phellogen is only occasionally seen even in very young roots. Many sections show none at all. Now and then, however, a single cell just below the cork appears to be a meristematic cell. Occasionally 3–6 such cells have been observed in a tangential row. The absence of a well-developed phellogen is not surprising, however, since there are (even in a 5-year old root) only 3–5 rows of cork cells. The phellogen cells as seen now and then are in transverse section about 8 microns (radial diameter) by 20 to 40 microns (tangential diameter).

Secondary Cortex.—The secondary cortex is made up entirely of living parenchyma cells which are filled with a substance globular in shape, varying in size and being oil-like in appearance.

These cells immediately below the cork are narrow and elongated tangentially. In transverse view they are about 15 x 60 microns. This type of cell comprises the first 4–6 rows of the outer cells. Sometimes they gradually widen until they become nearly isodiametric or only slightly tangentially elongated or they may remain about the same size and a sudden change in size and shape is then seen in the parenchyma lying adjacent to this narrow zone of cells. The cell walls at this juncture are very often much thicker than at any other place in the cortex. The author has seen them as thick as 12 microns, especially at the corners. The average wall thickness of the cortical parenchyma is 2–4 microns.

The cells making up the rest of the cortex are more or less isodiametric in transverse section, although they are as a whole slightly elongated tangentially. The cells in this region show no evidence of radial rows which one might expect if their origin was entirely from a secondary meristem. In the reporter's opinion this is because cell division takes place throughout the entire cortex during the life of the plant. With properly stained specimens many cells distinctly show evidence of recent cell division (Fig. 2). Often after staining, a cell that first appeared as a single cell will show 2 nuclei and a very thin protoplasmic wall, separating the 2 new cells. Others show a cellulose wall extremely thin, while still others show walls of varying thickness up to the maximum for this tissue. Mitotic figures have been seen in occasional cells.

PHLOEM.

The phloem is for the most part made up of parenchyma in radial rows. There is considerable variation in the size and shape of the cells, sieve is confined almost entirely to the inner half adjacent to the cambium and found in small isolated patches (Fig. 3). As described under the lens view, the region almost always shows more development on one side of the root than the other. The various differences are described in the cellular structure of the phloem working through the thicker portion from the cortex to the cambium and using the same specimen as in the lens view as a type. The phloem at its widest point runs to within 6 or 10 cells of the cork. It is not difficult to definitely see where the phloem and cortex join because of the regular radial arrangement of phloem cells in contrast to the irregularity of the cortical cells. This juncture is not even, however, some medullary rays running farther in the cortex, some less.

There are two groups of cells which form nearly concentric bands in the phloem alternating with each other and gradually becoming closer together until when rather near the cambium, they are only a few cells apart.

The parenchyma cells of the phloem in transverse section vary from 5 to 50 microns in diameter. The larger ones are closer to the cortex and gradually diminish in size until near the cambium they are extremely small. It is in this portion of the phloem that sieve tissue is found in small isolated patches.

The parenchyma varies in shape from isodiametric to rectangular cells. Invariably the elongation is in the tangential diameter. The isodiametric cells form bands in the phloem. The bands are from 2 to 8 cells wide and alternate with similar bands of the tangentially elongated cells. These give rise to the concentric lines seen in the lens view. The isodiametric cells average, in the outer portions of the phloem, about 35 microns. The cell walls are about 4 microns thick, showing only slight variations in thickness and composed of cellulose. Occasional simple pores are seen on all walls. The middle lamella often stands out very distinctly, especially in stained specimens in which case it takes up more of the stain than the thickened portions. The phloem parenchyma shows the same cell contents as the cortical cells.

The bands of tangentially elongated cells are not as wide as those composed of the parenchyma just described. Usually there are fewer cells in the ring and the radial diameter is considerably less. This type of cell averages in transverse section 35 by 10 microns. The cells do not break up the radial rows because their tangential diameter is the same as that of larger cells. The walls are somewhat thicker (5 to 6 microns). The bands closer to the cambium consist of smaller cells, although in radial number they remain about the same.

It will be seen from the foregoing description that the wide portion of the phloem is made up of two distinct types of parenchyma cells giving rise to alternating bands of tissue having different physical characteristics. This arrangement is referred to again under the discussion of the keel.

The sieve tissue in transverse section is seen in small patches close to the cambium and sometimes out to about the middle of the phloem; seldom farther. Each patch is made up of about 15 to 20 cells. The average sieve cell is 15 microns in diameter and isodiametric in transverse section. Associated with the sieve cells are smaller cells (companion cells) about 7 microns in diameter. The sieve patches appear to be made up of cells with rather thick cell walls. This, however, is only relative and due to the small size of the lumen. The cell walls are about 3 microns thick which is often slightly thicker than the walls of the surrounding parenchyma. This frequently causes the sieve patch to be more refractive and stands out from the other tissues more pronouncedly.

Adjacent to the parenchyma wedge of the xylem the phloem may be entirely wanting or consist of a few cells in radial rows forming a continuation of the medullary ray through the cambium and into the bark for perhaps 5 to 10 cells. Opposite the middle portion of the ray there is less likely to be phloem tissue present while near the juncture of the ray and lignified portion of the xylem, the phloem is definitely present (Fig. 3).

The author has never seen sieve tissue in the phloem directly adjacent to the wide medullary ray of the xylem. If the lignified portion of the xylem is circular in transverse section and especially if the primary xylem is nearly centric, the phloem is quite normal in its development and forms completely around the xylem.

If the primary xylem is markedly eccentric, the phloem is also eccentric and forms about the same way as when the large parenchyma wedge is present.

Longitudinal Section of the Cortex and Phloem—Cortex.—The cells in the cortex, in either radial longitudinal section or tangential longitudinal section, show little difference in appearance from the transverse section already described. The cells are for the most part isodiametric. The cells near the cork which are tangentially elongated in transverse section are almost circular in the radial longitudinal section and elongated in tangential longitudinal section. They are, therefore, similar in arrangement and somewhat in size and shape to the cork cells. There is one noticeable difference in the size of the cortical cells which it is believed is significant and accounts for the peculiar rings or knurls seen in the fresh root and to some extent in the dried root. The cells at the narrowest diameter of the root, that is between or separating the bulged portions, are appreciably smaller than those found in the region of greater diameter. They are often more radially elongated also. Assuming that the cells in a given longitudinal plane all originate at about the same time, it can readily be seen that if a certain portion of the cells increase greatly in size and another portion only slightly, the surface area will be increased unequally and this in turn will cause a bulging where the greater increase in the size of the individual cells has taken place. As stated under the description of the root, the knurls do not run all the way around the root. There are none where the keel forms. The microscopic examination shows little or no cortex at this region and the cells are about equal in their development. The knurls in size (thickness) follow well the thickness of the cortex; as the cortex narrows down so do the knurls correspondingly decrease.

Often oblique bands of elongated cells are seen in the longitudinal sections which appear to be part of the cortex but are probably phloem cells of a lateral root. It is believed that in many cases the lateral roots leave the main root in a long curve rather than making a sharp turn. This would account for the fact that after selecting a small portion of root free from lateral roots on the surface, there still appears strong evidence of their presence in the various microscopic sections.

Phloem—Longitudinal Section—Radial.—All of the cells of the phloem are very much elongated. They average about 150 microns. Some will occasionally attain a length of 250 microns. The end walls of a radial row of cells are usually in the same plane and if a cut is made as nearly radial as possible, these end walls form almost a straight line across the field of view. If the cut is not radial or varies only slightly from it, the lines are lost because the end walls are not found in the same plane in tangential rows of cells.

The sieve cells are not easily differentiated in the longitudinal view. Being only 5 to 10 microns in diameter, they appear as long lines of cell wall material and can hardly be distinguished from the narrow parenchyma surrounding them. Occasional cells nearer the cambium are free from the characteristic oil-like cell contents and these are undoubtedly the sieve cells. The smaller companion cells seen in the transverse section are extremely difficult to observe in the longitudinal view.

The same bands of cells seen in the transverse section are also plainly visible in the radial longitudinal section. Those with the thicker walls are narrower and more highly refractive to light. In many of these cells the end walls are slightly thicker than the lateral walls.

In the bands made up of the larger cells, the only noticeable difference besides their size, is that in many cases, especially those nearer to the cortex, the end walls are more oblique or rounded, often giving the individual cells a cigar-like shape. Small intercellular spaces are seen at the juncture of such cells.

Longitudinal Tangential Section.—Since the tangential diameter of the phloem cells varies only slightly except that the diameter gradually becomes less toward the cambium, there is no marked difference in the appearance of the cells in a single section. In comparison to the radial view, however, there are besides the uniformity of the cells two noticeable differences. *First*, the end walls do not fall in the same plane and the tissue appears as a network of elongated cells. *Second*, the end walls are not straight across, that is, at right angles to the long axis of the cells but are oblique and often rounded. The end walls of the parenchyma of the phloem are therefore wedge shaped. Sections near the xylem show cells very difficult to differentiate because of their narrow diameter and relatively thick walls and appear more as a mass of lines, the end walls being indistinct.

3. *Cambium.*—The cambium forms a complete circle around the xylem. It is much more

distinct adjacent to the wide parenchyma wedges of the xylem where it often forms a rather wide zone (Fig. 3, C.). In specimens that have been dried and subsequently softened, it is seldom seen except at this region. In fresh material, especially if collected during the growing season, it may be seen adjacent to the lignified portion but differs from that over the ray in that it seldom forms a "zone" but is only one cell wide for the most part. The cambium cells correspond in tangential diameter to the tissues lying adjacent to it (Fig. 3). The radial width is from 3 to 6 microns. The nucleus and the rest of the protoplast are very prominent. Iodine stain often brings out the cambium ring more pronouncedly because of the dense protoplasmic content.

4. *Xylem* (*Transverse, Tangential, Radial*).—The xylem may conveniently be divided into two parts, the lignified portion and the non-lignified portion. The former consists of tracheal tubes, wood fibres (fibre tracheids) and the narrow lignified medullary rays. The latter consists entirely of parenchyma and has been referred to several times before as the parenchyma wedge or wide medullary ray.

Transverse Section.—The elements of the lignified portion are first described in the order named.

Tracheal Tubes.—The tracheal tubes are oval to circular, a few showing more or less straight sides and are therefore somewhat angular. Most of them, however, are only slightly oval, the greater diameter being radial. They vary in diameter from 20 to 50 microns. Most of them average 40 microns, the larger and smaller being less frequent. Those of the primary xylem, which are plainly visible in all roots, are 5 to 15 microns in diameter.

The common cell wall, between either two tracheal tubes or between a tracheal tube and fibre, show slight variations; the average thickness being from 5 to 7 microns. Pores of a very peculiar formation are seen in the wall of the treacheal tubes. They appear as a chain of elongated small intercellular spaces about 5 microns long and 1 to 2 microns wide.

The tracheal tubes seldom occur in groups of more than two or three and are for the most part separated from each other by a few fibres or medullary ray cells. In a low power view the tracheal tubes can be seen to form in rather obscure tangential rows, more pronounced near rings of growth which are for the most part made up of fibres.

Wood Fibres or Fibre Tracheids.—The fibres are quite angular in this view varying from almost square to triangular to several sided. They vary in size from 5 to 18 microns. The thickness of the common cell wall between two fibres is about the same as that between the tracheal tubes and fibres, 5 to 7 microns. It is possible that as a whole the thickness is very slightly less between the fibres. The same type of pores is found in the walls of the fibres as those described in the tracheal tubes.

The fibres generally are elongated somewhat in their tangential diameter. This is especially noticeable when they occur in radial rows of 4 or 5 cells as they do in the annual rings. Generally there are only 1 to 3 fibres separating the tracheal tubes from each other.

The middle lamella stands out rather distinctly in unstained specimens, being more refractive than the secondary wall thickening. In stained specimens it takes up more of the stain.

The Medullary Rays of the Lignified Portion of the Xylem.—It is very difficult to distinguish between the fibres and medullary ray cells in the transverse view. The walls of both are lignified and are the same thickness and the cells are about the same size and shape. However, close observations under the high powers of the microscope will differentiate them. In general the medullary ray cells are radially elongated. It must be borne in mind that occasionally the fibres are also radially elongated or isodiametric. Also, sometimes a few medullary ray cells will be tangentially elongated or isodiametric.

In fresh material the medullary ray cells often show the characteristic cell contents of the bark parenchyma. This is not so easily seen in material that has been dried and later softened with water, nor is it seen in material which has been kept for some time in strong alcoholic solutions. The most constant and perhaps surest way to distinguish these cells from the fibres is by the type of pores found in their walls. The pores of the medullary ray cells are simple and in transverse view show the typical picture of this common type of pore, the middle lamella being free from secondary thickening for a short distance. They are about 1 to 3 microns in diameter and occur less frequently than do the pores of either the fibres or tracheal tubes.

The lignified medullary rays are from 1 to 4 cells wide and run in many cases almost to the primary xylem but never up to it. At the start of secondary growth in the xylem the cambium

invariably produces several layers of fibres almost always free from tracheal tubes and in all the observations made, entirely free from medullary rays (Fig. 3, P.X.).

The Wide Parenchyma Wedge or Medullary Ray of the Xylem.—This type of ray is of course not always present in the transverse section of the root. About five of the sections cut (which totaled some 2000) were free from such non-lignified rays. Two or more may be seen in some sections. The individual cells of the unlignified xylem rays resemble very closely the parenchyma cells of the phloem rays, perhaps somewhat larger especially near the cambium. The cells form in remarkably straight radial rows (Fig. 3). They show considerable variation in size. Those nearer the center of the root are much smaller than those nearer the cambium. They gradually increase in size from about 8 microns to 40 microns. Those cells adjacent to the lignified cells show much less increase in size and remain throughout the length of the ray about the same size as the bordering lignified cells. Sometimes they also exhibit partially lignified walls (Fig. 4).

Occasionally a band of tangentially elongated parenchyma is seen to run through the ray. In the author's opinion this is formed as an annual ring because it is usually continuous with such a ring in the lignified portion of the xylem. The formation of rings in this region is, however, by no means constant (Fig. 3, M.R.).

The same cell content as found in the bark is also found in the parenchyma of the ray.

Longitudinal Tangential Section—Tracheal Tubes.—The tracheal tubes are made up of segments, or units, of about 160 microns long, although there is considerable variation from this. Many are much shorter. Occasionally one is seen that is no longer than it is wide. The end walls are only partially dissolved out so that the diameter of the opening between segments is less than the diameter of the tracheal tubes away from the ends. The end walls, or rather the portion remaining, is readily seen in radial view, and it is often impossible in the view to tell that only a portion of it has dissolved out. They are oblique, forming rather sharp angles with the side walls, and one segment dovetails with the section directly above or below.

The pores of the tracheal tubes in this view are long and slit-like, running very nearly at right angles to the long axis of the cell. The pores vary in size and give rise to two distinct types of markings, those with very narrow openings, 1 micron or less, and those with wider pores, 2 to 3 microns, which because of their length (5 to 10 microns) and closeness to each other, give rise to the typical reticulate form of tube. The pores are 3 to 6 microns apart and about equally distributed throughout the walls. It is because of their closeness to each other that they appear in the transverse section as a string of small openings in the walls. Although the sections may be very thin, they are usually greater than the longitudinal diameter of the pore.

Longitudinal Radial Section—Fibres.—The wood fibres are elongated, tapering cells, whose end walls dovetail together. They average about 225 microns long. The pores of the fibres are also slit-like but much shorter than those of the tracheal tubes. They differ also in that they are oblique and a shadow forming the so-called border is more distinctly seen around the pores of this tissue than those of the tracheal tubes. Often only a single row of pores is seen along one surface of the fibre. Their maximum length is about 3 microns and their width 2 microns or less. They occur in the walls about as frequently as those of the tracheal tubes (Fig. 4).

Longitudinal Tangential Section—the Lignified Medullary Rays of the Xylem.—It is in this view that the lignified medullary rays are most easily recognized. The cells are longitudinally elongated and resemble in general very short wood fibres. Most of the cells have tapering end walls, but frequently the side walls show some tapering and the end walls form at right angles to these. The average length of the cells is about 60 microns, but here again much variation is often seen. An isodiametric cell is not uncommon. In length they may approach the fibres.

The one factor that remains constant is the less frequent occurrence of pores in the walls. Often in this view an entire radial wall may not show a single pore. This is not due to the fact that there are actually a far less number of pores in the medullary ray cells, but due almost entirely to their very small size. The pores are only slightly elongated and are 2 microns, or less, in diameter, so although their centers may be about the same distance apart as the centers of the longer and larger pores of fibres and tracheal tubes, they are cut less frequently in sectioning, hence the apparent absence of pores on large portions of the walls.

On the tangential wall the pores appear as small bordered elongated dots. They are on the average about 6 microns apart.

The medullary rays vary in height from a few cells to many hundreds of cells, often being several millimeters long. Their width is seldom over 5 cells.

Longitudinal Tangential Section—the Wide Parenchyma Ray.—The parenchyma are essentially alike in this view. The cells are isodiametric and corresponding in size to their tangential diameter as seen in the transverse view. The cells of the sections cut closer to the cambium are larger than those farther in toward the center of the root. The cells do not occur in rows but rather form a network.

Longitudinal Radial Section.—The radial longitudinal section simulates the tangential longitudinal section in most respects. The following differences may be observed—medullary rays are rarely seen for their entire depth—visible portions of them show cells slightly radially elongated. The markings appear similar to those described in the longitudinal section tangential view.

In radial section the junctures of a large number of tracheal tubes appear obliquely circular. In contradistinction to this, these same junctures in tangential section appear as oblique lines. The end walls, therefore, before being dissolved out, lie for the most part obliquely in a tangential direction.

5. Primary Root.—The primary roots show a very simple and normal development. They are very small, almost hair-like, and the average primary root is 0.3 to 0.5 mm. in diameter.

The epidermis consists of oval-shaped cells in transverse section, the longer diameter being tangential. The average tangential diameter is about 18 microns and the radial 10 to 12 microns. The cell walls are about 2 microns thick, except the outer, which is thicker because of a cuticle 1 micron or so thick. Only occasional root hairs are seen.

The primary cortex is relatively large and is made up of rather large parenchyma. The entire cortex, however, is only 4 to 5 cells wide. The outer half consists of one or two rows of cells about 35 by 30 microns tangentially elongated. The next row of cells is usually somewhat larger and radially elongated, about 35 by 40 microns. Next to these, a circle of smaller cells 18 by 12 microns is easily recognized because of the sharp contrast in size with the cortical cells. This is the endodermis. The cell walls are hardly thicker than the cortical parenchyma.

The radial fibrovascular bundle is a diarch. The xylem is made up entirely of tracheæ, of which there are about 15. They are 5 to 15 microns in diameter. The two phloem patches on either side of the row of tracheæ consist of a few very small sieve tubes (15 to 20 cells). Occasionally larger parenchyma cells are also found in this region. The average sieve cell is about 6 microns in diameter in transverse section. These roots very soon become secondary and give rise to roots which at first appear to be normal, but very soon the eccentric xylem becomes apparent, which is always the result of secondary growth in Senega root.

(D) DISCUSSION OF SOME OF THE ABNORMAL DEVELOPMENTS EXHIBITED BY SENEGA ROOT.

In order to study the abnormal development in the xylem a model of the lignified portion was built. A typical root 5 cm. long was cut into 1135 consecutive sections, each mounted in glycerin jelly, and each in proper order and orientation with respect to the original root. With the aid of a camera lucida the lignified portion of the xylem of each section was drawn at a magnification of about 15 × onto cardboard. Each drawing was then cut out and numbered. The cardboards thus represented, to a fair degree, magnified sections of the xylem. They were then glued together in proper order one after another. To insure proper alignment in building up the model, a straight longitudinal cut was made through the bark of the original root before the sections were cut. Then, in drawing the outlines of the xylem, a ruler was placed parallel with this cut and a line drawn across the xylem.

With careful attention these lines were made to fall directly over each other in gluing the sections together. After all the sections were thus built up, a thin layer of plastic paint was spread over the surface to smooth out the slight ridges unavoidably formed by the layers of cardboard. The whole was then painted pale yellow, the natural color of the xylem (Fig. 8).

Several interesting observations may be made from the model. Although it is invariably stated that the keel forms opposite the wide medullary rays only, it will readily be seen by comparison with the original root (Fig. 6) this is not always true, for if it were true, in the particular specimen the keel should be markedly spiral at some parts of the root and entirely absent at others. It is on the contrary quite linear and uniform in size and shape.

At the outer portion of the medullary ray wedge, the lignified xylem exhibits a distinct flare, the edges of which often extend beyond the normal limit of the xylem cylinder.

It is also interesting to note that a rather wide but short medullary ray is formed immediately below each root branch. In cutting many other specimens, this condition has been found to be quite constant in Senega root.

It can also be readily understood why sections of the same root, cut rather close to each other, present such marked and widely different formations in the xylem. It is not unusual to cut transverse sections 1 mm., or less, apart and find in one section a normal circular xylem and in others a xylem, semicircular, or even V-shaped.

Perhaps the most interesting abnormal development in Senega root is the development of the keel upon drying. The literature I have been able to review has not adequately explained nor offered a satisfactory theory as to how the keel is formed. The following is offered as a physical explanation of their formation.

If one were to imagine a small piece of apparatus built from strips of metal and a block of wood in a manner to be described, it would be possible to observe a similarity in the physical make-up of it and the phloem of Senega root. If several strips of metal of varying lengths were securely fastened to a block of wood in such a way as to cause the strips to form in wide ellipses as indicated in Fig. 9, one could imagine these to represent the bands of radially narrow and thicker walled cells described under the miscroscopic description of the phloem. Now if a tenacious and adhesive material, which would shrink upon drying, were filled in between these bands, it would not be difficult to see that forces would result which in turn would cause a sharper bow to take place in the strips of metal (which resist any change in length) at their greatest diameter (Fig. 9a, b and c). This would appear as a ridge when viewed from the side. The adhesive material corresponds to the bands of larger and thinner walled cells of the phloem.

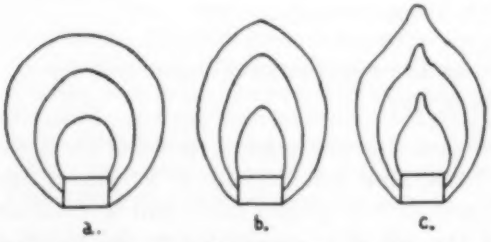


Fig. 9.—Diagram of apparatus to illustrate formation of keel.

While the bands of cells do not by any means simulate the actual physical properties of the metal and adhesive material, their behavior upon drying, due to

their arrangement and cell characteristics, must correspond somewhat to the imaginary piece of apparatus.

In other words, there are in the phloem two sets of alternating bands, one composed of larger and thinner walled cells, which will shrink more upon drying than the second set, composed of narrow tangentially elongated and thicker walled cells which will resist shrinking and will, therefore, be subjected to the pull of the cells of the first set and as with the metal, a ridge will result.

The bands are more pronounced in some roots than in others, some showing practically no trace of them. Likewise, some roots form prominent keels, others do not.

In concluding, the author wishes to acknowledge the many valuable suggestions given by Professor E. H. Wirth, of the Department of Pharmacognosy, during the progress of this work.

THE HISTOLOGY OF CRACCA VIRGINIANA LINNÉ ROOT.*,[1]

BY B. V. CHRISTENSEN[2] AND ELBERT VOSS.

Cracca virginiana, Linné, root (Leguminosæ—devil's shoestring, goat's rue, catgut, etc.) has recently come into special prominence following the discovery of its insecticidal properties by Little (1), and the isolation of rotenone and tephrosin from the root by Clark (2). The fact that commercial samples of rotenone are at present limited to foreign sources, being obtained only from derris and cube roots, makes it highly desirable to develop a native source yielding an abundance of this insecticidal material. The United States Department of Agriculture, Bureau of Plant Industry, is at present making an extended study of *Cracca virginiana* root, with the hope of finding varieties of it which may be of insecticidal value or of value as commercial sources of rotenone. Many samples have been collected by the author from the Southeastern United States, and others in other sections, and sent to the department for tests of their insecticidal value and rotenone-yielding qualities. Through these tests there is being accumulated a large amount of information as to localities, soil types and varieties of the root yielding the best quality of crude drug.

Should the findings of the Department of Agriculture confirm the hope that *Cracca virginiana* root offers an American source for the valuable chemical, rotenone, it will be desirable to know its essential histological characteristics and the histological characteristics of related species in order that they may be differentiated. The object of the present work is to present the histological and morphological characteristics of *Cracca virginiana* root, along with the histological and morphological characteristics of closely related species of Cracca available in this locality.

In addition to the histological and morphological characteristics there are

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* Scientific Section, A. PH. A., Portland meeting, 1935.

[1] From an abstract of a dissertation presented in partial fulfilment of the requirements for the degree of doctor of philosophy at the University of Florida, School of Pharmacy, Gainesville, Florida, June 1935.

[2] Director of the School of Pharmacy, Head of Department of Pharmacognosy and Pharmacology, University of Florida.

also chemical tests for rotenone (3), and a chemical assay for rotenone (4) which may be used in evaluating samples of any of these materials.

In this paper the histological and morphological characteristics of *Cracca virginiana* root are discussed rather thoroughly; in discussing other species only the points of difference between these species and *Cracca virginiana* root are pointed out.

CRACCA VIRGINIANA ROOT.

The roots are long, often attaining a length of three or four feet and averaging about $^3/_4$ cm. in diameter. They are hard, fibrous, and break with a short fracture. The color externally is a light grayish brown, internally a pale whitish yellow. They have a spicy odor and faintly spicy taste that is followed by a moderate degree of pungency. The powder is of a light grayish yellow color.

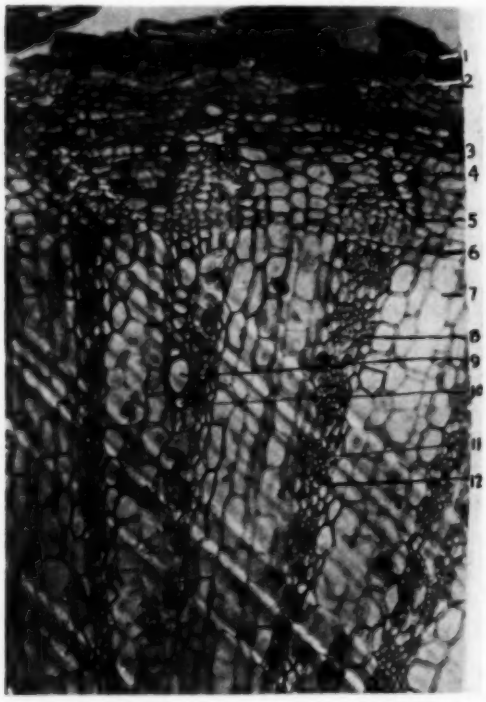

Fig. 1.—Transverse section of *Cracca virginiana* root through the outer stellar region and bark. 1, Cork; 2, phellogen; 3, cortical parenchyma; 4, bast fibres; 5, phloem; 6, cambium; 7, medullary ray; 8, xylem, including: 9, vessel; 10, tracheid; 11, wood fibres; 12, parenchyma cells. ×100.

HISTOLOGY.

Transverse, tangential-longitudinal and radial-longitudinal sections were examined. A study was also made of the isolated tissues and the powder.

The cork consists of up to 15 layers of radially arranged, tangentially elongated and slightly lignified cells; the cortical parenchyma region consists of about 15 layers of tangentially elongated, thin-walled cells. (See Fig. 1.) Bast fibres occur singly or in groups of up to ten, being most numerous in regions radial to the fibro-vascular bundles. The individual fibres are polygonal or oval in transverse outline, and generally contain a faint, dotlike lumen. Many are bordered by serially arranged parenchyma cells, each of the latter containing a solitary crystal of calcium oxalate.

The fibrovascular bundles are radially elongated, narrowly wedge-shaped and alternate with medullary rays of a width about equal to that of their own. The medullary rays are up to eight cells in width, the patches averaging from three to four millimeters in height; the individual cells are slightly lignified and most of them are irregularly pitted. They are generally quadrangular in outline in transverse and radial-longitudinal sections, and polygonal in tangential-longitudinal sections.

The phloem patches average three or four cells in width; the individual cells are thin-walled and polygonal in outline. The tissues composing the xylem areas are vessels, tracheids, wood fibres and parenchyma cells. The vessels vary greatly up to 100 microns in diameter and all are highly lignified. They occur most numerously in the central region; in the outer regions they occur singly, in pairs, or in groups of several, the latter often having a radial arrangement. In

longitudinal sections they are characterized by numerous transverse, slit-like or oval markings which often have a sclariform arrangement (see Fig. 2).

The tracheids occur in close proximity to the vessels. They are polygonal in transverse outline, average about 20 microns in width and 120 microns in length. Their side walls contain varying numbers of transverse, oval or longitudinal markings.

Parenchyma cells occur adjacent to the vessels, bordering the medullary rays, or serially arranged and superimposed upon the wood fibres and containing solitary crystals of calcium oxalate. They are polygonal in surface outline and have heavy, slightly pitted walls.

Wood fibres are numerous in rather compact groups between the vascular areas, and occasional ones occur in proximity to the vessels. Wood and bast fibres are not differentiable in the powder (see Fig. 3). Both are highly lignified, very long, the side walls parallel along the point. They generally contain a distinct, narrow lumen, which extends the greater length of the

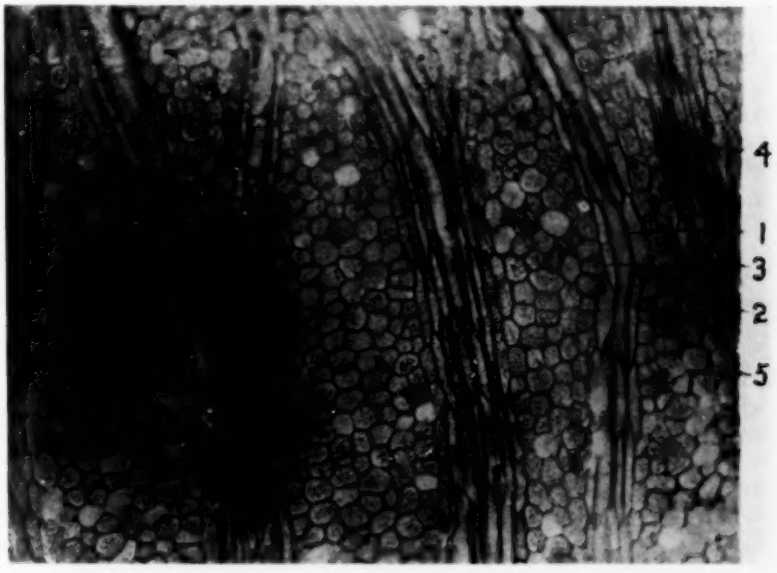

Fig. 2.—Tangential-longitudinal section of *Cracca virginiana* root. 1, Vessel; 2, tracheid; 3, parenchyma; 4, wood fibres; 5, medullary rays. ×100.

fibre. Crystal fibres are rather numerous in the powder; the crystals are mostly of the rhombic type, occasional ones being of hexagonal or monoclinic types.

Irregular, structureless, grayish white masses of inulin are occasionally seen in the powder.

Starch is abundant in the parenchyma, medullary rays and tracheids of the stellar region. It is abundant in the powder. Most of the grains are simple, with a fairly high percentage of di-compound grains and a few tri-compound grains. The simple grains are spherical, ovoid or polygonal in outline, vary up to 30 microns in diameter with the average about 20 microns. Some of the simple grains with straight sides appear to have been derived from compound grains. Simple grains and component elements of compound grains generally contain a distinct hilum, which is central or excentral, dotlike or cleft, the cleft sometimes branched; under polarized light each shows two dark bands crossing at slightly acute angles at or near the center.

CRACCA LATIDENS.

1. Roots of *Cracca latidens* are distinctly more grayish in outward appearance and of a whitish gray color internally; the powder is of a whitish gray color and not pungent when tasted.

2. Fewer vessels and associated tracheids in *Cracca latidens* root; the central region is distinctly less vascular, while in the intermediate areas of the xylem no groups of vessels were found to number more than four.

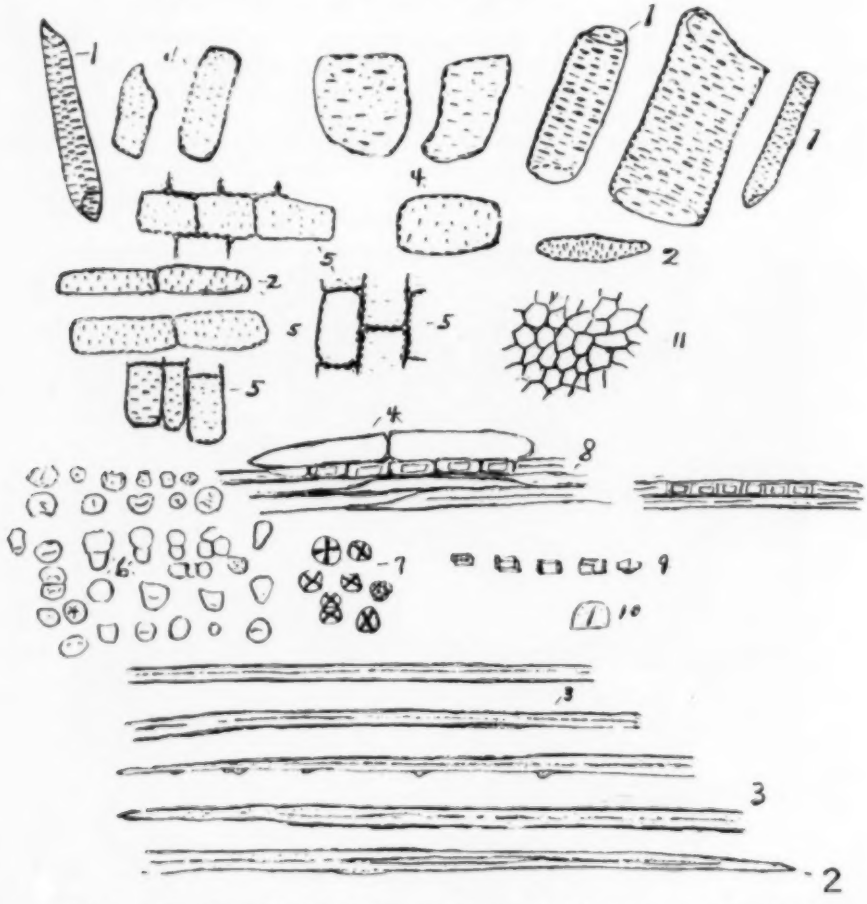

Fig. 3.—Powder and isolated tissues of *Cracca virginiana* root. 1, Vessels; 2, tracheids; 3, sclerenchyma fibres; 4, parenchyma cells; 5, medullary rays; 6, starch grains; 7, starch under polarizer; 8, crystal fibres; 9, crystals; 10, inulin; 11, cork.

3. More bast fibres in the cortical parenchyma region; groups containing as many as 20 fibres are frequently observed.

4. No calcium oxalate in *Cracca latidens* root.

CRACCA AMBIGIRA.

1. The roots are fleshy, 10 to 12 inches in length, and about $^1/_2$ cm. in thickness and contain few secondary roots. They are grayish white externally and whitish internally; the powder is of a grayish white color.

2. The xylem areas are less vascular in the central and intermediate regions, but distinctly more vascular in the outer regions. The side walls of the vessels contain more numerous transverse markings.

3. The arrangement of tissues in the xylem areas differs further in that groups of parenchyma cells occur between compact groups of wood fibres and between the wood fibres and vascular tissues.

4. Numerous cells in the cortical parenchyma region and occasional ones in the xylem areas have a resinous content; solitary crystals of calcium oxalate are also more frequent.

5. Sclerenchyma fibres are less numerous in the powder, with a correspondingly greater amount of parenchyma and starch. The side walls of the parenchyma and medullary ray cells are more distinctly pitted.

6. Compound starch grains are more frequent and large aggregates of starch are also numerous; the simple grains are smaller, averaging from 6 to 10 microns in diameter.

CRACCA HISPIDULA.

1. The root is slightly fleshy, from 6 to 10 inches in length and about $^1/_2$ cm. in thickness, and bears few secondary roots. Externally it is a grayish brown color and internally a faint grayish yellow color.

2. Central regions of this root vary considerable in structure. Some sections present large thin-walled parenchyma cells and a few vessels surrounded by tracheids, others contain a larger number of vessels in association with many tracheids and a few wood fibres and contain very few parenchyma cells. There are various gradations of structure between these two extremes. Vessels are fewer in the intermediate areas, but more numerous in the outer xylem areas.

3. Groups of parenchyma cells occur between compact groups of wood fibres and between the wood fibres and vascular areas.

4. Sclerenchyma fibres are less numerous in the powder with a correspondingly greater amount of parenchyma and starch.

5. In addition to di- and tri-compound starch grains, small aggregates of starch are rather frequent. The simple grains average about 10 microns in diameter, with occasional ones up to 15 or 20 microns.

6. The medullary rays are up to six cells in width, and average from 1.5 to 2 millimeters in height.

CRACCA SPICATA.

1. The root is slightly fleshy, from 6 to 10 inches in length and contains few secondary roots. The color externally is grayish, internally whitish gray; the powder is of a grayish brown color.

2. Large groups of bast fibres in the cortex; these number up to 35 or 40 fibres, the average number being about 15 or 20. The lumen of the bast fibres is relatively large, elliptic, ovoid or elongated in outline; individual fibres are only slightly lignified.

3. Vascular elements are relatively much less numerous. From 6 to 12 large vessels and associated tracheids are found in the central region and the vessels are also much less frequent in the intermediate and outer regions.

4. The arrangement of tissues in the xylem areas differs further in that groups of parenchyma cells occur between compact groups of wood fibres and between the wood fibres and vascular areas.

5. The medullary rays are up to five cells in width. The individual cells are not lignified and have smooth walls.

6. The powder contains a greater amount of parenchyma and starch. The walls of the parenchyma cells are smooth.

7. Practically all starch grains are simple, a few are di-compound. The simple grains are up to 20 microns in diameter, the average being about 12 microns.

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A STUDY ON THE WASHING OF MILK OF MAGNESIA THROUGH A PERMEABLE MEMBRANE.*

BY E. MONESS, W. A. LOTT AND W. G. CHRISTIANSEN.[1]

Milk of Magnesia is usually prepared by precipitating magnesium hydroxide from a solution of magnesium sulphate by means of sodium hydroxide. The sodium sulphate resulting from this double decomposition, along with any excess sodium hydroxide must be removed from the magma, or suspension of hydrated magnesium hydroxide. This removal of electrolytic impurities from the milk of magnesia, technically called "washing" the milk of magnesia, is usually not carried out by filtration methods in view of the adverse effect upon the stability of the suspension which seems to accompany any thickening of the milk of magnesia to the extent necessary in that procedure.[2] The degree of thickening which occurs during the settling of the suspension in decantation methods of washing does not seem to be detrimental to the subsequent stability of the product, and decantation methods in some form or another are therefore in fairly general use.

The decantation method involves, however, some very important disadvantages. The rate of settling is very slow even when the temperature is maintained well above that of the room in order to hasten it. Due to this required temperature maintenance and to the long periods of time required for settling between each decantation, the method does not lend itself to the economy in water that could accrue through using, in the earlier stages of the washing of any particular batch, water which has already been used for the later stages of the washing of previous batches.

Without considering, for the moment, any technical questions of handling in plant practice, it seemed that these difficulties could be obviated in a method whereby the milk of magnesia is washed by means of wash water separated from it by a permeable membrane. It was to be expected that the diffusion of electrolyte through that membrane would require much less time than that required by the repeated settlings.

In taking up a theoretical consideration of the problem of washing milk of magnesia by means of the diffusion of the electrolyte through a permeable membrane into the wash water on the opposite side of that membrane, it will be seen that Fick's Law will require some alteration.

Thus, Fick's Law states that the amount of solute d S which will cross a given cross-sectional area "a" in time dt, is expressed by

$$\frac{dS}{dt} = -Da\frac{\delta_c}{\delta x}$$

* Section on Practical Pharmacy and Dispensing, A. PH. A., Portland meeting, 1935.

[1] Research Department of the Chemical and Pharmaceutical Laboratories, E. R. Squibb & Sons, Brooklyn, N. Y.

[2] We have at present no experimental basis for a theoretical discussion of the factors which determine the stability, or other physical characteristics of the milk of magnesia. Based upon general theory and analogy with colloidal hydrous oxides which have been more closely studied, we have assumed the colloidal character of milk of magnesia to be $[MgO].(H_2O)x$ and that any mechanism which will bring about a decrease in the value of x will cause the stability of the suspension to be decreased.

when $\frac{\delta_c}{\delta^x}$ is the concentration gradient in the direction of x, and when D is the so-called diffusion constant or specific diffusion rate for the solute in question.

Under the conditions of our proposed experiment there will be the additional circumstance that free diffusion of the solute will be impeded by the permeable membrane. This impedance factor would be a constant, characteristic of the chemical nature, physical texture and thickness of the membrane. Therefore the value of D would be altered by the constant factor K.

$$\frac{dS}{dt} = -K\ Da\ \frac{\delta_c}{\delta x}$$

If we should now accept the additional condition that the milk of magnesia on the one side of the permeable membrane and the wash water on the other side of that membrane shall be agitated so that no concentration gradients of electrolyte shall exist on either side of the membrane, then the concentration gradient $\frac{\delta_c}{\delta^x}$ can be replaced by the factor $(C^M - C^W)$ in which C^M is the concentration of electrolyte in the milk of magnesia and C^W is the concentration of electrolyte in the wash water, so that the question of distance is eliminated except in so far as it implies the two sides of the membrane. Thus,

$$\frac{dS}{dt} = -K\ Da\ (C^M - C^W)$$

One more condition of the proposed experiment differs from simple diffusion, namely, that some solute will be adsorbed on the extensive surface of the milk of magnesia. This factor will be important in so far as it affects the value of $(C^M - C^W)$ in the above formula. This value can of course be affected by this adsorption only by affecting the element C^M. Since only the non-adsorbed part of solute in the milk of magnesia is freely diffusible, C^M refers only to the non-adsorbed portion of the solute in the milk of magnesia. The total concentration of solute within the milk of magnesia is equal to

$$C^{M\ total} = C^{M\ adsorbed} + C^{M\ free}$$
$$\text{or}\quad C^{M\ free} = C^{M\ total} - C^{M\ adsorbed}$$

but from the well-known Freundlich adsorption isotherm we can see that

$$C^{M\ free} = C^{M\ total} - MK\ C^{M\ free\ 1/n}$$

M = quantity of adsorbent
K and n = constants characteristic of adsorbent and substance adsorbed.

Due to the configuration of the exponential curve for the value $-MK\ C^{1/n}$ (the Freundlich adsorption isotherm) we know that for large values of $C^{M\ free}$ the *relative* values of the adsorbed material are small so that $\frac{C^{M\ free}}{C^{M\ total}}$ = almost unity, and the error due to dropping the adsorbed solute from consideration is small. When the value of $C^{M\ free}$ becomes small then ***relatively*** the importance of the adsorbed solute becomes enormously larger, due again to the configuration of the exponential curve for $-MK\ C^{M\ free\ 1/n}$ (Freundlich adsorption isotherm). Now, the value of $\frac{C^{M\ free}}{C^{M\ total}}$ can become much less than unity.

At any rate, the theoretical basis upon which the problem should be viewed is the following equation which has been derived in the above manner from Fick's Law of Diffusion and Freundlich's adsorption isotherm.

$$\frac{dS}{dt} = -K\ Da\ \ (C^{M\ total} - M\ K\ C^{M\ free\ 1/n} - C^W)$$

In practice, the importance of segregating for special consideration this influence of adsorption will depend upon the efficiency of the suspended material as an

adsorbent and the capillary activity of the solute. If one were to attempt, for example, to wash an efficient adsorbent material like a suspension of kaoline free from a highly capillary active solute like butyric acid the phenomenon of adsorption might become the factor of utmost importance and the simple diffusion of the unadsorbed portion the factor of lesser importance.

In the specific problem with which we were confronted the solute which was mainly sodium sulphate was a substance of very low capillary activity; the suspended semi-colloidal hydrated magnesium hydroxide was, however, a fairly efficient adsorbent. That adsorption phenomena play a rôle in the progress of the "washing" of milk of magnesia was not doubted. Since preliminary experiments by the diffusion method and past experience with the decantation method gave no indication that this phenomenon was sufficiently influential to present any special problem, no effort was made to determine its magnitude experimentally. The experimental work to be described was not carried out for the purpose of obtaining data with which to test the validity of the above equation or to obtain numerical values for the various factors involved. The work was entirely preliminary in nature, and its sole purpose was to gain some conceptions as to the type and size of equipment which might be required to "wash" milk of magnesia by a diffusion method, as well as the economies in time and water that might be inherent in such a method.

In spite of the fact that the equation derived was not actually used with the data presented in this paper, the mathematical analysis upon which it is based did furnish the complete understanding of the factors involved in this method of washing milk of magnesia which was deemed necessary to the proper planning of the experimental work.

EXPERIMENTAL.

A cylindrical bag made of canvas filter cloth, three inches in diameter and eight inches high, was suspended in the center of a two-gallon crock, so that the bottom of the bag remained about one inch from the bottom of the crock. A 500-cc. sample of recently precipitated milk of magnesia was put into the bag and enough water into the two-gallon crock to bring it to the same level as that of the milk of magnesia. This required 4800 cc. of water. Both the milk of magnesia within the canvas bag and the water outside this bag were continually and vigorously agitated by means of motor-driven stirrers in order to fulfil the requirement that no concentration gradient of electrolyte should exist either in the milk of magnesia or in the water, and also so that the milk of magnesia should not be able to settle nor to form crustations upon the inner surface of the bag. The progress of the diffusion, or "washing," was followed by means of periodic conductivity measurements on the wash water. No effort was made to record these conductivity measurements in absolute units. In fact, they were recorded in arbitrary scale readings which were equal to the reciprocals of the conductivities multiplied by a constant; *i. e.*, ohms $\times$ constant. A resistance of about 900 scale divisions was from previous work known to be that which corresponded to a fully "washed" milk of magnesia; the same conductivity cell being used throughout. Distilled water so measured gave a reading of 1000 scale units.

As equilibrium between the concentrations of the electrolyte in the milk of magnesia and in the wash water is approached, the time-resistance curve tends to become parallel to the line of abscissæ. When this tendency made itself apparent the particular portion of wash water was considered spent and was replaced by another portion. Plate No. 1 shows these time-resistance curves for each portion of wash water.

In order to wash the 500-cc. sample of milk of magnesia to a conductivity of 1/910 scale divisions a total of 33.6 liters of water was required, and an elapsed time of 13.5 hours at 60° C. This is five times as much water as was used in a parallel washing of the same quantity of milk of

magnesia by the decantation method, but the result was accomplished in only one-tenth of the time required by the decantation method.

The relatively larger quantities of wash water used in this method than those used in the decantation method are not inherently required by the diffusion method; but result from the use of rather large portions of wash water. As is well known, great economy of wash water for the washing of precipitates can be effected by the use of many small portions of wash water rather than a few large portions. For the same mathematical reasons, similar economy can be brought about in the diffusion method of washing by the use of many and smaller portions of wash water outside the bag.

In order to investigate the economy of water to be effected by the use of very small portions of water each brought fairly close to equilibrium with the milk of magnesia, before discarding it, it was considered expedient to abandon the use of mechanical agitation of the several portions of wash water and to allow it to flow through an annular space between the canvas bag holding the milk and the external vessel. This was accomplished by the simple procedure of substituting a smaller

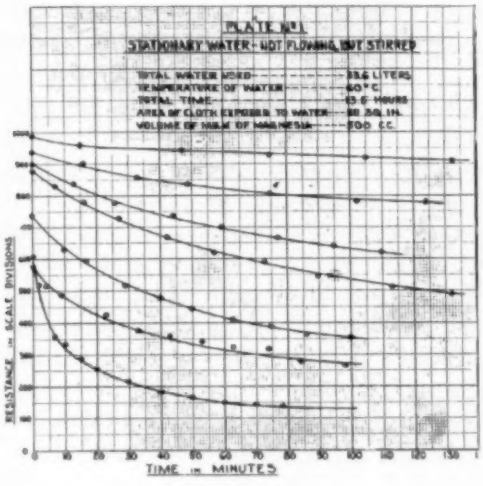
PLATE No 1
STATIONARY WATER - NOT FLOWING BUT STIRRED
TOTAL WATER USED ---------- 33.6 LITERS
TEMPERATURE OF WATER ---------- 40° C
TOTAL TIME ---------- 23.6 HOURS
AREA OF CLOTH EXPOSED TO WATER ---- 80 SQ. IN.
VOLUME OF MILK OF MAGNESIA ---- 200 C.C.
RESISTANCE - SCALE DIVISIONS
TIME - MINUTES

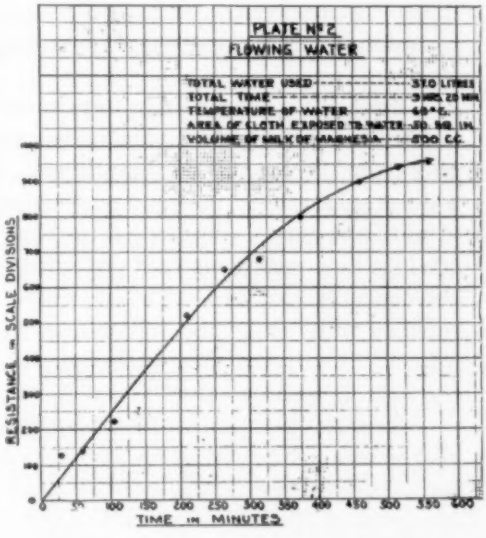
PLATE No 2
FLOWING WATER
TOTAL WATER USED ---------- 370 LITRES
TOTAL TIME ---------- 3 HRS. 20 MIN.
TEMPERATURE OF WATER ---------- 40° C.
AREA OF CLOTH EXPOSED TO WATER - 80 SQ. IN.
VOLUME OF MILK OF MAGNESIA ---- 200 C.C.
RESISTANCE - SCALE DIVISIONS
TIME - MINUTES

vessel around the canvas bag described in the above experiment, so that the walls of the vessels were about one inch distant from the walls of the bag. The water was allowed to flow in at the bottom and to overflow at the top. The annular space was, of course, still too large to allow the linear rate of flow of the water to be sufficiently rapid to provide good agitation and at the same time to be in contact with the canvas bag for a sufficiently long time to come into equilibrium with the milk of magnesia.

It would, however, have presented too many mechanical difficulties to provide an annular space so small that the linear flow could have been rapid enough to be turbulent and still allow the required length of contact. In the absence of these mechanical requirements either time or water economy had to be sacrificed, and it was decided for the moment to sacrifice the latter. It will be seen from the graphical representation of the result in Plate No. 2 that the time required to accomplish the complete washing of the milk of magnesia was still further reduced, indicating

that when the annular space occupied by the wash water is sufficiently small, it is not necessary in practice to provide mechanical agitation to the wash water providing it is flowing at a moderate rate. From a consideration of the data on Plate No. 2 it will be seen also that due to the balance struck between the various factors it was not possible with equipment of the dimensions used to retain the full advantages of water economy without making a compensatory sacrifice of time.

It would be theoretically possible, of course, to adjust the dimensions of the equipment so that fuller advantage of the economies in both time and water could be had. Practically, however, this would be difficult and it was decided to pass immediately to the more practical experiment about to be described.

As intimated in the introduction, the saving of time afforded by the diffusion method of washing milk of magnesia makes it possible to consider a counter-current system. Such a system, if designed for continuous operation, would require long canvas tubes through which the milk would have to pass very rapidly in order to obviate deposition of magnesium hydroxide on the canvas walls. The mechanical difficulties involved in such a method would be considerable, and since we were concerned only with evaluation of the principle, an intermittent counter-current system was employed.

Each of five canvas bags was charged with 400 cc. of milk of magnesia, and suspended in a separate washing vessel containing three liters of wash water. Crude milk from the precipitation kettle met, in the first washing unit, wash water high in sodium sulphate (its washing power almost spent), and was allowed to remain therein until the curve, constructed for time against resistance approached a horizontal straight line, indicating that concentration of solute in the wash water was nearing the concentration of that in the milk. The bag was then removed to the second washing unit where the initial concentration of sulphate in the wash water was lower. Finally the fifth wash was distilled water, in which the bag was left until the milk showed a conductivity of 1/900 scale units.

Regular operation of this discontinuous counter-current system showed that one charge was completed every two and one-half hours. A complete washing, therefore, required twelve and one-half hours, and while actually coming in contact with fifteen liters of wash water, each charge required only three liters of fresh water.

The economy of water obtained in this manner was, of course, very great. The amount of water used was only one-half of that required by the decantation method for an equivalent volume of milk, and only one-tenth of the amount required by the diffusion method in the first experiment above described.

The question of any practical utilization of this scheme would depend on a great many points, the consideration of which was not undertaken. It was possible from the above results, however, to calculate the dimensions which would be necessary for washing any given quantity of milk of magnesia in such a system.

Mathematically it is apparent that any of the dimensions of the canvas bags containing the milk of magnesia can be altered at will, so long as the amount of water which was found necessary to wash a given volume of milk is supplied and so long as the following relationship is maintained.

$$\frac{\text{Area of interface} \times \text{Time of exposure}}{\text{Volume of milk}} = \text{Constant}$$

Substituting the values found in the laboratory experiment, in which five bags, each containing 400 cc. of milk of magnesia, were washed 12.5 hours:

$$\frac{191.4 \text{ sq. in.} \times 12.5 \text{ hours}}{0.529 \text{ gal.}} = 4522 \text{ sq. in.-hours per gal. of milk}$$

Applying this data to plant scale equipment, a series of five canvas bags three feet in diameter by four feet high, having a total capacity of 1060 gallons of milk and a total effective area of 32,290 square inches would require 148 hours for complete washing, thus delivering 172 gallons of finished milk per 24 hours. Six such operating units would deliver approximately 1000 gallons.

These calculations are of course correct only in proportion to the extent to which the fundamental factors can be maintained unchanged in passing from a small laboratory scale to the plant scale. That this cannot be done is best illustrated by the fact that in the system we have visualized for plant practice, each outer vessel must contain 1590 gallons of wash water. Therefore it must be eight feet in diameter, if the bottom of the bag is to be one foot from the bottom of this kettle. Since the cloth bag containing the milk of magnesia is only three feet in diameter the annular space between the containers will be two and one-half feet. This is hardly comparable to the one-inch annular space in the laboratory equipment. The abandonment of agitation in the external wash water in the laboratory experiment was based on the rapid diffusion of the sodium sulphate and the small annular space, *viz.*, one inch, so that the concentration gradient could still be considered negligible. This would hardly hold good in the plant-size equipment now visualized and therefore one would need to assume agitation on both sides of the canvas once more in order to use these calculated dimensions.

SUMMARY.

A mathematical analysis has been presented for the case of washing a material in suspension by means of water separated from it by a permeable membrane. The effect of adsorption as well as simple diffusion has been considered, and an equation derived from Fick's Diffusion Law and Freundlich's adsorption isotherm.

A practical evaluation of this method of washing as applied to milk of magnesia has been carried out.

PHYSICIAN AND PHARMACIST.*

BY RALPH W. CLARK.[1]

The past quarter of a century has witnessed rapid changes in the character of the retail drug business. However, the drug store is and always has been an essential and responsible factor in caring for public health. To what extent this position will be preserved depends, I believe, somewhat upon what we as pharmacists do in our position in a triangle involving physician—yes, dentist and nurse, and pharmacist and the public.

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* Section on Practical Pharmacy and Dispensing, A. PH. A., Portland meeting, 1935.

[1] Instructor in Pharmacy, University of Wisconsin, Department of Pharmacy; *Chairman*, Committee on Inter-Professional Relationship of the Wisconsin Pharmaceutical Association.

Medicine and pharmacy are sister sciences which have traveled hand in hand down the centuries from early times, since self-preservation has been instinctive in the human race. Dentistry and nursing are newer members of the public health professions but they occupy important positions.

The modern drug store is an institution containing a conglomerate assortment of merchandise. The proprietors of these stores vary in type as much as the stores they operate. It appears, then, that the approach to the physician, dentist and nurse is an individual problem. Much has been written about the subject assigned to me, but most of it is not of the kind which discusses the pharmacist himself. The problem, as I see it, is to convert more and more pharmacists to high professional standards which will naturally lead to better inter-professional relationship.

A pharmacist is influenced by several things: namely, college training, the literature he reads and the pharmaceutical associations to which he belongs, as well as the environment in which he works. The first three will be discussed briefly before anything is said about the individual responsibility of the pharmacist.

The present educational requirements make it necessary for the young pharmacist to have a college education before he may be licensed to practice pharmacy. It is desirable for each college of pharmacy to have as a member of its faculty at least one man who is particularly interested in inter-professional relationship, as students need information in this field which also furnishes a good point of contact between the college and those engaged in the practice of pharmacy.

The next generation of pharmacists will be of higher professional standing because of the advance in educational requirements. These men should be taught methods of contact with members of the related health professions as well as a profound interest in public health. They should above all things be imbued with a higher sense of their own professionalism. With a background of the usual things taught in the pharmacy school, they should be better able to carry on the type of contact which pharmaceutical manufacturers have found very valuable.

Many pharmacists do very little reading in either trade or professional magazines. These publications carry much useful information and pharmacists should be more familiar with them. Perhaps more emphasis on contemporary literature in colleges of pharmacy would get our future pharmacists into better reading habits. The pharmaceutical press has been and should continue to be of value in educational programs. From time to time campaigns have been inaugurated against irregular prescription pricing and other practices involved in inter-professional relationship.

National pharmaceutical associations are helpful in keeping a unity of purpose throughout the states and in supplying valuable material for use in this work. State pharmaceutical associations play an important part in the progress which may be made. In Wisconsin much more interest is being shown in inter-professional relationship meetings throughout the State during the year and in conventions of the Wisconsin Pharmaceutical Association, the report of the chairman of the committee on inter-professional relationship and the talk in a similar vein by O. U. Sisson stimulated more discussion than usual, in fact, more than most other parts of the program, showing that pharmacists are becoming conscious of the value of this work. Here the state association is doing its part by holding the

meetings referred to and by continual publicity in the *Wisconsin Druggist*, official publication of the Association. This practice is more or less common to other states.

The unfortunate thing about inter-professional relationship activities in a state association is that the officers will spend about ten cents per store in the state on a project like this and feel that they have done well by it while they will spend many times this amount on other activities. On the other hand, every man showing an interest in this field of endeavor is of great value to his association and it is encouraging to note that the number is gradually increasing.

The public and the members of the public health professions will not believe that "the druggist is more than a merchant," nor that he is a professional man if certain individual pharmacists do not uphold the standards involved. People are generalizers. If a pharmacist is careless in compounding one prescription, they are inclined to say that all pharmacists are careless in compounding all prescriptions. What we need is less unfavorable publicity showing a lack of interest in public health; less development of the liquor and restaurant portions of drug stores and more cleaning up and merchandising of the prescription department. Pharmacists who have not neglected this part of their stores have been and will continue to be better off than those who run a business too much like a department store.

Pharmacists must watch out for the public's interests and the interests of the members of the public health professions, as well as their own. They may call upon a physician or dentist to ask what service they may be to him. By keeping up-to-date on new remedies, and, unless I am mistaken, in many cases, getting better acquainted with the current revision of the U. S. P. and N. F. as well as other books and magazines, the pharmacist calls on a physician or dentist well-prepared to carry on a friendly, intelligent conversation, and inspire in him an interest which may be of mutual benefit. The physician may be surprised to know how misleading some of his orders are and that he should not price them to the patient as he knows little about the cost, overhead and turnover in the prescription department. He may be made to see that a trial balance drawn between counter-prescribing on the one hand and office-dispensing on the other would show no advantage to either profession, not to mention the effect upon the patient whom both professions should serve to the best of their ability.

The physician may be willing to prescribe more U. S. P. and N. F. preparations when he is told what they contain and the reduced cost of the medicine to his patient. He will be surprised to learn that certain proprietary products, especially those with short, easily remembered names, widely prescribed by physicians a few years ago are now advertised directly to the public. He may be made to understand that real compounding is an art and that pharmacists are better qualified than he to do this work. He may be shown that individual prescriptions are often better than bottle to bottle proprietary preparations which may be used by every physician in town. He may become a good friend, a better physician and a better prescriber.

Coöperation with dentists, a new field, should be undertaken with caution. There are several drugs of proven usefulness in the U. S. P. and N. F. as well as many other items with which the pharmacist should acquaint the dentist. Den-

tists will welcome such efforts if the pharmacist uses intelligent reasons, drawn from the ideals of both professions, to recommend his services and they may become prescribers instead of dispensers.

It is necessary for pharmacists to show an interest in public health; to favor public health legislation; to be interested in civic affairs. In this way favorable publicity may be had which will help in the contact with the public and the public health professions. It is necessary for pharmacists to emphasize service and quality, not price, in their contact with the public health professions. Substitution should, by all means, be avoided but the pharmacist should make use of his skill and training in promoting U. S. P. and N. F. products. He should be sure to point out that more than materials go into a prescription and the cost to the patient will, therefore, not be in direct ratio to the cost of the ingredients. Pharmacists should make more use of their professional training and should consider their skill, accuracy, responsibility, time and overhead in the selling price of a prescription. The public and the public health professions can be made to understand these things only if the pharmacist is professional and acts as a professional man should.

If every pharmacist were an asset to his profession the accumulation of favorable publicity would be far-reaching. If professionalism were stressed somewhat more, the public would be willing to pay for more than the materials which go into a prescription and to accept the pharmacist as more than a merchant. If more pharmacists were willing to put their own houses in order first, then good inter-professional relationship would fast become a fact instead of an ambition stimulated by the decrease in the number of prescriptions being filled. Such individual activity would help inter-professional relationship and raise public opinion of pharmacists. It would be far better than sitting back as a witness to the modern spectacle of having a supposedly intelligent American audience receive its instruction in medication over the radio, the dispensing done by highly trained script readers or black-faced comedians, or rocked into a false sense of healthful security by sweet music advertising nostrums "for sale in every drug store."

HONORING AGE AND SERVICE.*

BY JOHN E. KRAMER.[1]

A custom established in 1928, a mere seven years ago, would not seem to have gained very great historical importance in such a short space of time. But when the inauguration of the custom entailed an event that had happened fifty years before—history was definitely involved.

In the early Spring of 1928 the officers in charge of the pending Alumni Reunion of the Philadelphia College of Pharmacy and Science endeavored to induce as many graduates as they could to return to the College for the annual meeting of the Alumni Association and the various class reunions. Special stress was placed on the members of those classes who had graduated five, ten, fifteen and other intervals of five years before.

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* Section on Historical Pharmacy, A. PH. A., Portland meeting, 1935.

[1] Registrar, Philadelphia College of Pharmacy and Science.

The committee was gratified because of the interest aroused among the members of the Class of 1878. A surprising number indicated their intention of attending the reunion, and the committee cast about for some proper recognition of the fact that the returning members of the Class of 1878 had been fifty long years out of college and still had enough interest to return, some of them from distant points.

And so there was started, more or less in fun, the group known as the "Semi-Centennialists of the Alumni Association of the Philadelphia College of Pharmacy and Science," with handsomely printed and properly signed certificates, and, best of all, no dues and but one requirement, that of graduation a half century before.

The idea met with instant success and has been continued each year since 1928. The certificates have since been removed from the jocular blue-print class and have become neatly printed and nicely engrossed affairs. From 1928 to 1934, a total of 375 have been issued.

The phraseology of the certificates is quaint and original—

> "WHEREAS—so-and-so—a graduate of the Classof —— has most successfully completed fifty years of Post Graduate Extra-Mural-Honest-to-Goodness Service in the varied interests of his fellow men—he is hereby declared to be a Semi-Centennialist, and, as such, entitled to All the Privileges of this Illustrious Order.
>
> "In testimony whereof are hereby affixed the signatures of the officers qualified to bestow this Unique Recognition."

Then follows the date, and the signatures of the Alumni Association President and the Chairman of the Reunion Committee. A seal, reading "50 years, Humanitarian Service," is in the lower left corner of the certificate.

At a fitting ceremony at each annual meeting, these scrolls are awarded, and the appreciation of the recipients is wonderful to behold. One would believe they had received the highest awards possible in the field of pharmacy. Even those who are too far away, or too infirm to attend, and who have had their certificates mailed, are greatly impressed, as evidenced by their letters.

After all, why shouldn't age and service be properly recognized? For, as Nicholas Rowe, English poet, said, "Age sits with decent grace upon his visage, and worthily becomes his silver locks, who wears the marks of many years well spent, of virtue, truth well tried, and wise experience."

PHARMACY IN MEXICO.

BY G. G. COLIN.*

When dealing with the subject under consideration, pharmacy must be divided into two groups, professional and non-professional; the former is the graduate pharmacist and the latter, called "boticario," is a practical man with experience in routine pharmaceutical practice but without college training. There are about 5000 pharmaceutical establishments in Mexico, 95 per cent of which are managed by boticarios.

* Laboratorio Quimico, Central S. A. Mexico, D. F.

Now and then, as a consequence of lack of legal regulations on professional practice, not only in the pharmaceutical field, long and heated debates are heard in Congress when Article four of the Constitution is discussed. Professional pharmacists press on the necessity of limiting the practice to licensed, graduate pharmacists. On the other side of the question and several thousands strong, the boticarios appeal that this condition has prevailed for many years and that any legislation limiting their freedom to work is unconstitutional. The professional side brings forth weighty arguments as regards the menace to public health, the responsibility and security which only a professional man can offer in pharmaceutical practice, to safeguard the public and to insure accurate compounding of physicians' prescriptions. The outcome usually is that, considering the economic injury which would be caused to the majority, the regulations of Article four of the Constitution are postponed for the next period and the problem has remained unsettled for many years.

The Health Department controls the regulations and licensing of both kinds of pharmaceutical establishments, but its suggestion to make it compulsory that every pharmacy should have a graduate pharmacist to assume the responsibility of dispensing has not been considered legal by the upper authorities. The most that can be done to safeguard the public is to make a requirement whereby every pharmaceutical establishment must have a sign in a visible place, stating whether the proprietor or manager is a graduate pharmacist or not. The requirement is met by both by using the proper legend in the sign. The public apparently does not seem to read these signs or if it does, the significance of the fact is ignored.

In a general way it may be stated that pharmacy is not given the proper recognition it deserves, neither by the authorities nor by the public.

As regards scientific societies, there are two: the Sociedad Farmaceutica Mexicana and the Union de Quimicos Farmaceuticos. The former is upheld by the oldest pharmacists in the city and is responsible for the 1925 edition of the non-official Farmacopea Mexicana, an excellent reference book containing very valuable data on a large number of Mexican native drugs. However, it has failed to attract the younger element and its field of action and influence is very limited; its main purpose at the present time is to offer a small life insurance and financial assistance to its members. The latter has been organized on the basis of a labor union and as such defends the material interests of its members only.

There are a few pharmacists who working independently have contributed to the scientific progress of pharmacy by active research on native drugs.

Pharmacy has taken much the same modern trend here that is observed in other countries, that is, the tendency to become a commercial enterprise based on the sale of patent medicines with non-pharmaceutical side-lines. From the commercial point of view, the financial situation of the large majority of pharmacies in the country is not a very sound one. Price cutting on prescriptions and patent medicines has created a difficult problem as yet unsolved.

There is an actual unemployment problem among graduate pharmacists, whose services have no demand. As stated before, the financial situation of the "boticas" is such that they cannot afford to pay the salary of a pharmacist, although a few have made an effort to improve their standing by having one, part-time at least.

The situation as briefly described naturally hinders the progress of pharmacy

in the country. If both groups could come to an understanding, to organize for the betterment of the trade in mutual benefit the situation might improve. However, all efforts to unite have failed so far, each one meeting his problems separately.

Although the pharmaceutical and medical professions should be closely allied, the lack of organization of the former has not made it possible to approach the physicians for coöperation. The pharmacist, individually and in isolated cases, does try to offer his close coöperation to physicians in a special neighborhood or territory but as a whole their relations are not as cordial as might be.

Such a situation is the outcome of present social and economic conditions. Labor problems arise continuously in a steel mill as well as in a pharmacy or a hospital, affecting skilled and unskilled labor, and the consequence is that the professional man is swept by this tide toward solidarity groups to safeguard material interests. Whatever few scientific activities are carried out by the pharmacist are of a strictly private nature, unpublished.

SOME THOUGHTS ON DISTRIBUTION.

E. L. Newcomb has stated: "It must be increasingly evident to all who have given the problems of distribution thoughtful study that the unfair practices and evils which exist may only be lastingly curtailed or removed when policies are adopted which are basically sound, fair to and in the interest of the consumers, all types of distributors and producers."

Liberty is taken in quoting the above; the thought underlies measures which are being considered by Congress and urged for national and state enactments. American industry has realized that the inequities which have existed must be corrected, and there has been expression in Congress relative to the necessity of righting the practices which are manifestly unfair because of preferences, and have resulted in undermining the business of a majority of dealers and making those who do not receive preferred (unfair) consideration, independents.

Some of the legislation in Congress has as a purpose the correction of unfair practice and it is being realized by the legislators that the destruction of the majority, or making it impossible for "small dealers" to carry on, affects the standard of livelihood of their constituents and citizenship in general. A further study may encourage the members of Congress to bring certain measures near completion to enactment.

Former and present practices may develop self-reliance, industry, energy and initiative, but the times demand a new feeling of social unity, a fairer distribution of privileges and a wider application of the Golden Rule.

"The Patent Office will celebrate its one hundredth birthday on July 4th. But it is really 46 years older than it officially admits, for in 1790 Thomas Jefferson, then Secretary of State, took on the job of granting patents.

"Edwin M. Thomas, of the Patent Office, who has made a detailed study of past records for publication of a special anniversary history, said that a look through the records clearly shows the trends of modern industry. The businesses of the future come first in the Patent Office and are recorded there about two years before they reach the public."—*Washington Post.*

TESTING THE RECOGNITION FACULTIES OF STUDENTS.[1]

BY JOSEPH H. GOODNESS.[2]

It is an almost universal truth that teachers dread examinations more than their students do. Perhaps some dread the long hours of tedious grading, but more do so because of the feeling that the examination is not a truly representative test of what the students have learned, or of what they should know. A too difficult examination finds the teacher searching for points between the lines, so that a passing grade may be given to the "average minds," whereas a too simple examination destroys the grading qualities of the test and finds the teacher searching for errors, so that the students may be graded comparatively. An all-practical or problem examination leaves the "mirror minds" among the failures, and an examination consisting only of questions discussed during the term ruinously affects the application of future classes. This last is the result of the "grapevine" information on instruction methods passed on to incoming classes. The teacher must, therefore, make an examination that is representative of the work covered during the year or term, that stimulates some original thought, and that does not destroy the chance of a last favorable impression of the subject; moreover the examination should be one that does not mark the course as a "snap," and that is not too short or too long for the student of average ability to answer in the time allotted.

The first two requirements are perhaps the most difficult to attain. To make a representative examination as well as one that stimulates thought has, sooner or later, led every teacher into the study of methods and means. Some conclusions which the author has reached during several years of study may be summed up as follows.

There are but two basic types of examination questions. *First*, the recollection type, which gives no clues and demands of the student a complete mental picture (recollection) of the answer before he can attempt to write; and *second*, the recognition type, which demands an understanding (recognition) of one of several given answers, or a rejection or acceptance of a conclusion furnished.

The recollection type is well known to all examiners. It is exemplified by such questions as, "Name the five parts of .....," "Give an example of .....," "Explain the operation of ....." and "List or outline ....." Here the student must recall, without aid from the question, the exact mental picture or pictures formed during lectures or readings, and coördinate them before he can answer. Unless the mental picture is complete, there can be no correct answer except, perhaps, by the rarest of guesses. There is no doubt that this type of question cannot be dispensed with in examinations, but it alone is not the answer to the search for a representative test of what the student has learned.

The recognition type of question, better known as the true-false question, is the other basic type. It appears in many disguises. A few of these direct the student to answer with a single word, "yes" or "no;" others request him to underline the correct word (of several), or to match the two (or more) parts that make sense, or to check the correct answer or to pick the best answer.

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[1] Based upon a paper read before the Section on Education and Legislation, A. PH. A., Portland meeting, 1935.

[2] Assistant Professor of Commercial Pharmacy and Economics, Massachusetts College of Pharmacy.

The use of this type of question is defended upon the ground that it saves time for both student and teacher, and that a knowledge of the facts involved is necessary before one can answer. The bad features of it, often overlooked, are *first*, that in all these forms the correct answer is already supplied needing only identification by some mark, or that there is a fifty per cent chance of guessing the correct answer; and *second*, that no provision is made to discourage guessing or to induce thinking that can be measured. Since, in these true-false tests, there is no way, by analyzing the shape of the check mark or underscoring, of sorting the guessers from those who really know, this type of question is decidedly imperfect and unfair if given solely.

On the whole, then, our conclusion seems to be this: For the equitable grading of students only the recollection type of question is good. So far, this is perhaps true. We must then question the reason for the existence of the recognition (true-false) form of examination. The answer, no doubt, is that its originators had studied the basic makeup of every day problems and found that very often the knowledge that something is wrong was all that was necessary to solve the immediate problem, and that to know the correct facts, if there were correct facts involved, was immaterial. For example, an error of dosage in a prescription whose author cannot be reached, or a claim of excessive profits for a store you had contemplated buying, or an impossible chemical result from known ingredients, all show instances where the mere knowledge that something is wrong is sufficient warning not to venture further. But, although this knowledge of a negative nature (recognition) is indispensable in practical life, up to the present time no examination system has been devised which will measure it accurately. The true-false examinations fail primarily because they do not set up inhibitions to the guess impulse that arises in students when the correct solutions are not forthcoming. In an attempt to lessen this fault, the author experimented with a new form of the true-false test which, he believes, overcomes more than half of the weaknesses usually found in the forms generally used. The remaining faults cannot be cured by simple means, if at all.

In this new form the testing is accomplished through the use of statements that may or may not require correction. The correction can be made only if the student thoroughly understands the statement as made, or understands a topic it comprehends. In short, the answers require both accurate recognition and recollection: recognition first, to inform the student of the accuracy or inaccuracy of the statement; then recollection, to make the necessary change of one word to correct the sentence, or to leave it untouched if the statement is correct.

SAMPLE SHEET OF A CHANGE-A-WORD EXAMINATION SHOWING PERMISSIBLE CORRECTIONS.

In the sentences below any *SINGLE* superimposed italicized word corrects the statement in which it appears. More than one change is shown in some statements to indicate how flexible correct answers to them may be. Accurate statements, some of which should be present, are omitted.

Directions: Correct only the inaccurate statements that follow. The correction must be limited to *CHANGING* only *ONE* word.

Economics.

food (2)
Gresham (1) *population* (3)

1. Malthus advanced a theory concerning money.

(Corrections are to read separately, thus:

(1) *Gresham* advanced a theory concerning money.
(2) Malthus advanced a theory concerning *food*.
(3) Malthus advanced a theory concerning *population*.)

copyrights (1) *protect* (2)
2. Patents and secrets create monopolies.
insurance (1)
3. Hedging, arbitrage and future contracts are methods of shifting risk.
stock (2) *industrial* (4)
run (1) *inventory* (3) *"corporate"* (5)
4. Money borrowed to build a factory is commercial credit.
partner (1)
director (2) *legal* (3)
5. A creditor possesses management rights in a business.
No (1) *partner* (2) *leaves* (3)
6. A stockholder dissolves a firm if he sells his interest therein.

Bookkeeping.

"Prepaid" (1) *income* (2) *liability* (3)
1. "Accrued" added to an expense title makes it an asset title.
Purchases (1) *expense* (2)
2. The Discount on Sales account is an income account.

Chemistry.

Ni (1)
Co (2)
Fe (3) *one* (4)
1. Copper has valences of two and three.
Copper (1)
Iodine (2) *K* (3) *Na* (4)
2. Zinc is below hydrogen in the electrochemical series.
Silicon (1)
Oxygen (2) *K* (3) *C* (4)
3. Sodium is more plentiful than aluminum in the earth's crust.
iodine
4. Chlorine, bromine and neon are halogens.

This type of examination fails in its purpose unless conducted under the inflexible rule that statements are not to be changed in any way if they are correct as they stand, and if they are wrong they must be corrected by the only permitted method of *changing* but *one* word. While at first glance this rule seems needlessly strict, the author has found that any relaxation whatsoever upsets the reliability of the results as a measure of recognition or else develops other bad features. For instance, when marking an inaccurate statement with an "X" was allowed if the student could not correct the error, some papers had as much as sixty-five per cent of the statements needing correction so marked; evidently no attempt was made to think out the correct answers. About the same result was obtained when students were allowed to underline the incompatible words if substitute words for one of them were not recalled. (This fault may be tolerated under some arrangements.) To allow changes of more than one word gave students an opportunity to transform law questions into chemistry and pharmacy questions into arithmetic.

Because of the strict rule, the effectiveness of this examination is not left to the student's veracity. Of the six possible results that may occur in the completed statements, five of them are controlled by the rule; the sixth is not so well guarded,

but even here guessing is discouraged by it. Since statements as presented to the examined must be either accurate or inaccurate, the analysis of the answers in their different forms follows:

A wrong statement left unchanged shows a lack of recognition and receives no credit.

A wrong statement changed to another wrong statement may show recognition, but since the recollection is imperfect, gets no credit.

A wrong statement corrected gets credit for recognition and perhaps for recollection. If the change was merely a reversal of a positive to a negative, or vice versa, then only half credit can be given, for only recognition is proved.

A correct statement changed to an incorrect shows lack of both accurate recognition and recollection, therefore no credit is given.

A correct statement changed to another correct statement shows lack of accurate recognition, and even though accurate recollection is used, because of the rule, gets no credit.

A correct statement left unchanged may show recognition, and must get full credit even though the student may have guessed the answer.

In the last type of answer the tendency to guess is lessened, for the student who guesses finds it difficult to guess by inaction (not changing a word) and so very often slips into the five rule-made traps. If he does guess by the only undetectable method of not changing words, nothing but the student's honesty can disclose it. But there is some consolation in the fact that unchanged wrong statements will decrease the grade. Because correct statements are subject to the weakness of guesswork possibility, it is suggested that their number be reduced to considerably less than one-third of the examination. This will cut down undeserved credit, as was confirmed by an experiment described below in which a total of 425 correct answers contained 350 untouched correct statements (almost all identified as guesses).

The grader may, of course, relax the rule and give half credit for correct-to-correct changes, but if this is done the tendency of students to change all unrecognized accurate statements to known truths will be encouraged. Further, this credit should not be allowed unless notice to that effect was given before the test, for to omit such notice is to penalize students who follow the rule implicitly. If the test is mainly to measure recognition, the relaxation cannot be permitted.

To summarize the grading systems a chart follows in which "W" symbolizes inaccuracy, and "C" accuracy:

Statement.	Answer.	Rule Credit.	Relaxed Credit.
W	No change	None	None
W	W	None	One-half
W	C	One-half/full	Full
C	W	None	None
C	C	None	One-half
C	No change	Full	Full

The relaxed rule credits are not recommended for general use.

To measure the relative grading effectiveness of this new form of test, 97 students were given two examinations of twenty statements: an Advanced Pharmacy test in the true-false form which required only plus or zero signs for answers, and a Bookkeeping test in the change-a-word form. Each examination contained six

accurate statements in the positions 1, 2, 3, 4, 13 and 17; the rest were inaccurate. These subjects were chosen because the examined were not familiar with them, and so, if the examinations could grade recognition accurately, the grade received by each student in each examination should have been a zero. Any grade above zero must therefore arise from guessing, examination or grading weaknesses, or student knowledge. For assurance that real knowledge was not charged to guessing, students were asked to mark each answer that they were reasonably sure was accurate with a "K." Correct answers so marked were subtracted from the total correct answers to give the total correct guesses. Inaccurate statements marked with a "K" were treated as wrong. Students were required to answer all twenty statements.

Of the 97 sets of papers received, 12 were discarded: 2 because they were incomplete in the true-false test, and 10 because the examined had had some experience with bookkeeping. Summaries of the remaining 85 sets follow:

	Total Correct Guesses.	Total Correct Answers.	Total Correct "K's" (Know).	Total "K's" (Know).
True-false	699	732	33	79
Change-a-word	343	425	82	217

Number of Correct Guesses.	Grade Received for Guesses.	True-False Examination.	Change-a-Word Examination.
0	0%	0	4
1	5%	0	4
2	10%	0	17
3	15%	1	7
4	20%	3	14
5	25%	8	17
6	30%	3	14
7	35%	17	6
8	40%	14	1
9	45%	15	1
10	50%	11	0
11	55%	2	0
12	60%	8	0
13	65%	3	0
	Total students	85	85

	True-False.	Change-a-Word.
Average number of correct answers	8.61%	5.0%
Average grade on correct answers	43.05%	25%%
Average number of correct guesses	8.22%	4.03%
Average grade on correct guesses	41.10%	20.15%

As can be seen, the grading effectiveness of the change-a-word test is 103% higher than the old true-false test, or in other words, slightly more than twice as accurate.

Number of students getting a higher mark in the true-false test	70
Number of students getting a higher mark in the change-a-word test	6
Number of students getting the same grade in both examinations	9

Guessing in this examination is discouraged for other reasons than those already mentioned. For example, students cannot write a word with the same abandon exercised in underscoring or checking and so will think long before hazarding all on a guess. Also since there may be from one to ten or more corrections possible in many of the statements, thinking is encouraged. Not infrequently teachers will find conversions which they themselves had not anticipated but which show high intelligence.

Other advantages of this examination are that it can be easily and uniformly graded, it can be adapted to any subject, and it can be made very specific for commonly confused facts. Further, it can be made comprehensive without requiring a great deal of writing for the answers, since the mere mention of a topic in the statement demands a mental review which would perhaps require hours to put into writing—much of which thought can be "seen" in the relationship between the original statement and the completed answer.

Naturally, this form of examination, like all examinations, has limitations and cautions which must not be overlooked. *First*, it cannot entirely eliminate guessing. Guessing is a fault inherent in the student, not in the examination. This examination does, however, reduce guess-earned grades to a minimum by making many guesses easily discernible. *Second*, the examiner's difficult work precedes the efforts of students, since the statements must not be ambiguous (except perhaps for the inaccuracy); nor such that a change from the negative to the positive or vice versa will be encouraged; nor such that they suggest the answer through stilted use of the singular, plural or numerals. Nor should they all be of the short two-fact type (*e. g.*, a horse is a biped), nor too involved or complex. Sequence, series, definitions and commonly confused facts are excellent fields for the statements. *Third*, students must be taught in advance how to take these examinations. Unless this is done many will treat them as they do true-false tests, with which they are more familiar, marking them with plus and zero signs. And *fourth*, the examination does not sufficiently test student creative or recollective faculties. For this reason all examinations should contain the recollection type of question without clues, as well as problems which involve recollection. To prove this point, the standing of five of the highest and five of the lowest students in a class was compared with the standing of the same students in a change-a-word test. The class standing was determined by averaging for one-half of it the recitation grades of eighteen weeks, and for the other half, the two examination marks earned during the same period (one of the examinations included the comparison change-a-word test as one-fifth of the grade).

High				Low			
Averages of Term Examinations.	Average for Recitations.	Final Class Average.	Change-a-Word Examination Average.	Averages of Term Examinations.	Average for Recitations.	Final Class Average.	Change-a-Word Examination Average.
96	87	92	95	67	61	64	50
95	88	92	90	66	60	63	30
96	84	90	95	64	60	62	50
97	80	89	90	69	53	61	70
90	87	89	80	67	55	61	55

As can be seen, too wide a spread exists in many cases to justify the use of this

new examination as a sole grading device. This limitation is especially applicable when examinations are short and each answer bears a high credit rating.

When the author first used this form of examination, a questionnaire of the examined disclosed that of the 167 taking the examination 93 liked it and 74 disliked it. Although unsigned student comments are to be taken with a grain of salt, especially before the tests have been graded, they do point here to an encouraging acceptance.

THE MASSACHUSETTS PHARMACOPŒIA OF 1808.*

BY EDWARD H. NILES.[1]

The Pharmacopœia of the Massachusetts Medical Society was issued in 1808. In consideration of the fact that Pharmaceutical History is now a regular part of the curriculum of our colleges of pharmacy, it is the purpose of this paper to suggest that the Massachusetts Pharmacopœia is the logical background for the study of official pharmacy in the United States.

The preface of this book, written more than 125 years ago, treats of pharmacy and medicine in a rational way. The following statement is quoted:

> "Such a work is mutually convenient to the physician and apothecary. As it is the business of the physician to prescribe, and of the apothecary to prepare medicines, the physicians as a body ought to point out those articles of medicine, which they should ordinarily employ, and the standard preparations of them. . . . the professions of physician and apothecary are most distinct; and between those whose relation to each other is so important, a perfect understanding should exist. As this cannot be established between them as individuals, it is necessary that there should be uniformity, both in the pharmaceutical preparations and language. By the want of such uniformity, much inconvenience, and even very serious consequences have been produced."

The Edinburgh Pharmacopœia was frankly chosen as the basis of the Massachusetts book. However, the committee was permitted such omissions, alterations and additions as were found necessary. Among the most important additions were articles found and used in America, but not included in the Edinburgh Pharmacopœia.

The outstanding difference in the two books was one which reflected the independence of thought and disregard for European tradition, a characteristic of New England in that period. All previous pharmacopœias such as those of London, Edinburgh, Dublin, etc., had been written in Latin. That is, in addition to the titles, even the quantities and directions for compounding were written in Latin. In the Massachusetts Pharmacopœia only the titles were Latin, the text being in English.

When the first United States Pharmacopœia was issued in 1820, the committee apparently endeavored to steer a course that would be acceptable to tradition and also to popular demand. The United States Pharmacopœia proper was printed in both languages. The left-side page was in Latin and the opposite page was in English. This of course increased the size and cost of the book, and did not add to its usefulness in English speaking America. Old ideas die hard, and the same two-language plan was followed in 1830; but in 1840 and thereafter the United States Pharmacopœia followed the lead taken by Massachusetts in 1808, with English text only.

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* Section on Historical Pharmacy, A. PH. A., Portland meeting, 1935.

[1] Dean, Indianapolis College of Pharmacy.

Dr. Lyman Spalding was a native of New Hampshire, and practiced medicine many years in that state. He was familiar with the Massachusetts Pharmacopœia, as this book was officially adopted by the Medical Society of New Hampshire. Dr. Spalding, later, became the head of a medical school in New York State, and finally opened an office in the city of New York in 1814. About 1817 he began plans for the preparation of a national Pharmacopœia, and his proposals were favorably received.

The Massachusetts Pharmacopœia had been prepared by James Jackson and John C. Warren, as a committee. Dr. Warren was chairman at a meeting held in Boston, June 1819, when delegates were chosen to go to Washington and arrange for the first United States Pharmacopœia. Dr. Bigelow of Massachusetts and Dr. Ives of Connecticut represented the New England states or Northern District. They took with them a specimen pharmacopœia, and this no doubt was approximately that of Massachusetts. At a convention held in Washington January 1, 1820, five members were chosen to prepare the first United States Pharmacopœia, and Dr. Ives and Dr. Bigelow were included in this group.

The Massachusetts Pharmacopœia of 1808 listed 536 drugs and preparations; the first edition of the United States Pharmacopœia listed 532 items. There was a greater difference than the seven items in these two books, but more than ninety per cent of the articles in the Massachusetts book were included in the later publication. Some interesting differences follow:

Absinthium in the Massachusetts Pharmacopœia, 1808, in the U. S. P. 1830
Aspidium in the Massachusetts Pharmacopœia, 1808, in the U. S. P. 1860
Cochineal in the Massachusetts Pharmacopœia, 1808, in the U. S. P. 1830
Conium Seed in the Massachusetts Pharmacopœia, 1808, in the U. S. P. 1830
Althea Root in the Massachusetts Pharmacopœia, 1808, in the U. S. P. 1830.

The Massachusetts Pharmacopœia listed three emulsions under the Latin title Emulsio, including that of Sweet Almond. The United States Pharmacopœia had similar preparations from the beginning, but the title "Emulsion" was not official until 1880, nearly 75 years after its introduction in the Massachusetts edition.

The following drugs were in the first United States Pharmacopœia, but are strangely missing from the Massachusetts publication. Ginger, Gaultheria, Ergot, Carthamus, Cimicifuga, Coptis and Apocynum.

In passing, one may note a bit of chemical history or biography. The Massachusetts Pharmacopœia included "Carbonated Water," and gave a method of preparation by decomposition of calcium carbonate with sulphuric acid. In the working directions it recommends a Woulff bottle. Possibly the three commonest pieces of equipment in a general chemical laboratory are a Bunsen burner, a Liebig condenser and a Woulff bottle. The first United States Pharmacopœia lists "Carbonated Water" and uses the synonym "Seltzer Water," but it does not mention the Woulff bottle.

As a final analogy between these two books, it may be mentioned that the Massachusetts Pharmacopœia was published[1] in Boston at No. 47 Cornhill, while the United States Pharmacopœia of 1820 was published in Boston at No. 50 Cornhill.

[1] See also JOURNAL A. PH. A., for November 1935, page 941.

THE ANCIENT MEDICINAL USES OF GEMS AND PRECIOUS STONES.*,[1]

BY A. RICHARD BLISS, JR.[2]

The love of precious stones has always been deeply implanted in the human heart, and the cause of this is found not only in their coloring and brilliancy, but also in their durability. The beautiful colors of flowers and foliage, and even the blue of the sky and the glory of the sunset clouds only last a short time, and are subject to continual change, but the sheen and coloration of precious stones are the same to-day as they were yesterday and will be to-morrow. In a world of change this permanence has a charm of its own that was early appreciated by man.

The object of this paper is to discuss and to illustrate the various ways in which precious stones have been used at different times and among different peoples, and more especially to explain some of the curious ideas and superstitions that have gathered around them. Many of these ideas may seem strange enough to-day, and yet when we analyze them we find that they have their roots either in some intrinsic quality of the stones or else in an instinctive appreciation of their symbolical significance. Through manifold transformations this symbolism has persisted to the present day.

Our scientific knowledge of cause and effect may prevent us from accepting any of the fanciful notions of physicians and astrologers of olden times; nevertheless, the possession of a necklace or a ring adorned with brilliant diamonds, fair pearls, warm, glowing rubies or celestial-hued sapphires will make a modern woman's heart beat faster and bring a flush of pleasure to her cheek. Life may seem better worth living to her; and, indeed, life is what our thoughts make it, and joy is born of gratified desire. Nothing that contributes to increasing the sum of innocent pleasures should be disdained; and surely no pleasure can be more innocent and justifiable than that inspired by the possession of beautiful natural objects.

From the earliest times in man's history gems and precious stones have been held in great esteem. They have been found in the monuments of prehistoric peoples, and the civilization of the Pharaohs, of the Incas or of the Montezumas did not alone invest these brilliant things from nature's jewel casket with a significance beyond the mere suggestion of their intrinsic properties.

The magi, the wise men, the seers, the astrologers of the ages gone by found much in the matter of gems that we have almost forgotten. With them each gem possessed certain planetary attractions peculiar to itself, certain affinities with the various virtues, and a zodiacal concordance with the seasons of the year. Moreover, the early sages were firm believers in the influence of gems in one's nativity, and that the evil in the world could be kept from contaminating a child properly protected by wearing the appropriate talismanic, natal and zodiacal gems. Indeed,

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* Section on Historical Pharmacy, A. PH. A., Portland meeting, 1935.

[1] A contribution from the Laboratories of Pharmacology, Howard College of Birmingham, Alabama, and the Reelfoot Lake Biological Station at Reelfoot Lake, Tennessee.

[2] Professor of Pharmacology and Dean of the School of Pharmacy of Howard College of Birmingham, Alabama; Director of The Reelfoot Lake Biological Station, Reelfoot Lake, Tennessee.

folklorists are wont to wonder whether the custom of wearing gems in jewelry did not originate in the talismanic idea instead of in the idea of mere adornment.

In medieval times the influence exerted by precious stones was assumed without question, but when the spirit of investigation was aroused in the Renaissance period, an effort was made to find a reason of some sort for the traditional beliefs. Strange as it may seem to us, there was little disposition to doubt that the influence existed; this was taken for granted, and all of the efforts expended were devoted to finding some plausible explanations as to how precious stones became endowed with their strange and mystic virtues, and how these virtues acted in modifying the character, health, fortunes or fate of the wearer.

Autosuggestion possibly affords an explanation of much that is mysterious in the effects attributed to precious stones, for if the wearer be firmly convinced that the gem he is wearing produces certain results, this conviction will impress itself upon his thoughts and upon his very organism. He may really experience the influence, and the effects may manifest themselves just as powerfully as though they were caused by vibrations or emanations from the precious stone.

This may serve to explain in the past the persistence of the belief in magic arts.

> Two or three hundred years ago, a Hungarian woman was accused of having murdered several hundred young girls, and at her trial she confessed that her object was to use the blood of her victims to renew her youth and beauty, for the blood of innocent virgins was supposed to have wonderful restorative and curative properties. In many parts of the world to-day there is a superstitious belief that an article of clothing worn by a person, or anything he has habitually used, absorbs some of his individuality. Therefore, a handkerchief, for instance, may be stolen and pinned down beneath the surface of a stream or pond on a toad, the pins marking the names of the enemy, the belief being that as the cloth wastes away, so will the body of him who has worn it. In medieval times sorcers made crude wax figures rudely resembling the persons against whom the spell was directed, and then thrust pins into such figures or allowed them to melt away before a slow fire, the enchantment of the sorcerer having supposedly caused some essence of the personalities to enter into the images, and therefore the living and breathing felt sympathetically the effects of the ill-treatment inflicted upon their counterfeits. This, doubtless, represents the origin of "burning in effigy."

The persistence of the cruel and perverted practices of old-time sorcery is illustrated by the fact that only a few years ago, in Cuba, three women were condemned to death for murdering a white baby so as to use the heart and blood as a cure for disease. It is not surprising that in half-civilized Haiti the Voodoo priests and priestesses demand from time to time a human sacrifice to appease their serpent-god. Several years ago a strange case was exposed in which a stupefying draught, capable of inducing a state of apparent death, was secretly administered to a sick man. When the attending doctor pronounced him dead, he was duly buried; but, two days after, the grave was found open and empty. The Voodoo worshippers had carried the man away so as to revive him and then sacrifice him at their unnatural rites.

Doctor DeBoot, Court Physician to Rudolph II of Germany, in 1609 gave the following opinion regarding the power inherent in gems:

> "The supernatural and acting cause is God, the good angel and the evil one; the good by the will of God, and the evil by His permission. What God can do by Himself, He could do also

by means of ministers, good and bad angels, who, by special Grace of God and for the preservation of men, are enabled to enter precious stones and to guard men from dangers or procure some special grace for them. However, as we may not affirm anything positive touching the presence of angels in gems, or to repose trust in them, to ascribe undue powers to them is more especially pleasing to the spirit of evil, who transforms himself into an angel of light, steals into the substance of the gem, and works such wonders by it that some people do not place their trust in God but in a gem, and seek to obtain from it what they should ask of God alone. Thus it is perhaps the spirit of evil which exercises its power on us through the turquoise, teaching us, little by little, that safety is not to be sought from God but from a gem.

"That gems or stones, when applied to the body, exert an action upon it, is so well proven by the experience of many persons, that anyone who doubts this must be called over-bold. We have proof of this power in the carnelian, the hematite and the jasper, all of which when applied, check hemorrhage. However, it is very necessary to observe that many virtues not possessed by gems are falsely ascribed to them."

In the middle of the seventeenth century Thomas Nichols wrote the prevailing opinion in England at that time as follows:

"But it cannot truly be so spoken of gems and precious stones, the effects of which are said to be the making of men rich and eloquent, to preserve men from thunder and lightning, from plagues and diseases, to move dreams, to procure sleep, to foretell things to come, to make men wise, to strengthen memories, to procure honors, to hinder fascinations and witchcrafts, to increase friendship, to hinder difference and dissension, to make men invisible, as is feigned by the poet concerning Gyges ring, and affirmed by Albertus and others concerning the *ophthalmius lapis*, and many other strange things are affirmed by them and ascribed to them, which are contrary to the nature of gems, and which they, as they are material, mixed, inanimate bodies, neither know nor can effect, by the properties and faculties of their own constitutions: because they being natural causes, can produce none other but natural effects, such as are all the ordinary effects of gems: that is, such effects as flow from their elementary matter, from their temper, form and essence; such as are the operations of hot and cold, and of all the first qualities: such as are hardness, heaviness, thickness, color and taste. These are all the natural faculties of gems, and these are the known effects of the union of their matter, and of the operation of the first qualities one upon another."

Some writers are of the opinion that the hypnotic influences possibly exercised by gems have not been subjected to careful, adequate investigation. The long-continued concentration of vision on an object tends to produce a partial paralysis of certain functions of the brain. This effect, it is said, may be observed in the helplessness of a bird when its gaze is fixed upon the glittering eyes of a snake. Likewise, those who gaze for a long period and without interruption on a crystal or glass ball, a diamond or other sparkling gem, may become partially hypnotized or even fall into an hypnotic sleep. Many believe this condition imparts an insight into the future.

During the early part of the eighteenth century Madam Frederike Hauffe, the "Seeress of Prevorst," a woman thought to possess remarkable and unusual clairvoyant powers, gave a series of interesting demonstrations of the effects produced upon a sensitive subject by the touch of minerals and precious stones.

Granite, flint or porphyry did not affect her, but fluorspar had a marked effect, relaxing the muscles, producing a sour taste (although the substance was simply held in her hand), and inducing at times a somnambulistic state. Barium sulphate produced an agreeable sensation of warmth, stimulated the muscles and made the subject feel as though she could fly; long application induced laughter. Rock-crystal also stimulated the muscles, awakened the subject from sleep and induced an aromatic odor. The diamond produced the same effects. The ruby produced a sensation of coldness in the tongue, rendered this organ so heavy that only incoherent

sounds could be made, caused the fingers and toes to become cold, and ultimately induced shivering. These effects, however, were followed by a sensation of elasticity and well-being, attended by the fear that a renewal of initial effects might take place.

As hypnotic agents precious stones may induce a physical impression which is heightened by the consciousness of the intrinsic value and the rarity of the substances. The fascination produced by a brilliant, glowing, sparkling, colorful set of jewels is due not only to the beauty of the gems, but largely to the consciousness that they are both rare and valuable objects, and are perhaps eloquent witnesses of love.

The literature as far back as the writings of Pliny describes the talismanic and therapeutic virtues attributed to precious and semiprecious stones. The Alexandrian literature of the second, third and fourth Christian centuries provides a rich source for these superstitious beliefs. In the seventh, eighth and ninth centuries a new literature made its appearance, probably in Asia Minor, and the manuscripts were written largely in Syriac and in Arabic. While this literature was developing in the Mohammedan world, the traditions of Pliny and Solinus were transmitted to the Christian world of the seventh and eighth succeeding centuries by Isodorus of Seville. A remarkable poetical treatise on the virtues of gems and precious stones was written by Marbodus, Bishop of Rennes, at the end of the eleventh century. Saint Epiphanius, Bishop of Constantia, wrote another curious and interesting treatise concerned with the twelve gems on the "Breastplate of Judgment of the High Priest" (Ex. xxviii, 15–21), which is valuable as the first of many attempts to identify the twelve stones. The special virtues of each stone are given also and this treatise may be accepted as the prototype of all the Christian writings on the symbolism of gems.

It is safe to say that, in the case of primitive man, the only attraction offered by precious stones was their color and brilliancy. The infant in his native admiration of what is brilliant and colored undoubtedly represents the mental attitude of primitive man. Probably the first objects chosen for personal adornment were those which were easily strung, for instance, perforated shells and colored seeds. Next came the softer stones wherein holes could be bored by the help of crude tools. The harder gems were valued as attractive toys long before man could adapt them to use as ornaments.

Unquestionably, when these stones had once been worn, there was a disposition on the part of man to attribute certain happenings to their power and influence. Thus there arose a belief in their efficacy, and, ultimately, the conviction that they were abodes of powerful spirits.

It has required centuries of enlightenment to bring us back to the love of precious stones for the esthetic beauty alone. Even to-day we can recognize the power of superstitious belief in the case of the opal, for example, which some timid souls still fear to wear. The coral is worn extensively to-day in Italy as the special charm of childhood, and a protection against the evil eye. Pearls are still dreaded by some and favored by others.

What supersubtle sense is it that leads some women to feel that their jewels partake of human emotion? A French writer, Mme. Catulle Mendes, says that she always wears as many of her rings as possible, because her gems feel slighted when she leaves them unworn. She continues:

"I have a ruby which grows dull, two turquoises which become pale as death, aquamarines who look like siren's eyes filled with tears, when I forget them too long. How sad I should feel if precious stones did not love to rest upon me!"

The medicinal use of precious stones has been traced to very ancient times. It has been thought that their employment for such purposes was introduced to Europe from India, whence many of the stones were derived. The earliest evidence points rather to Egypt as the first source.

The Ebers Papyrus, for instance, recommends the use of certain astringent substances, such as *lapis lazuli*, as ingredients of eye salves, and hematite, an iron oxide, for checking hemorrhages and for reducing inflammations.

The stones were used medicinally either in talismanic fashion or as mineral substances. In the former case the stones were merely worn on the person; while in the latter case they were reduced to a powder, mixed with wine, water or milk, and then taken internally. The belief in the curative properties of precious stones was at one time universal. It is true that the constituents of certain stones can be absorbed by the body and can produce a definite effect, but the greater part of the elements are so combined that they cannot be assimilated and consequently passed through the system without producing any apparent effect.

In ancient and medieval times the symbolism of color played a very important part in recommending the use of particular stones for special diseases. Thus, in the cases of red or reddish stones, such as the *ruby*, *garnet*, *carnelian* and *bloodstone*, these were thought to be almost infallible remedies for hemorrhages and inflammatory diseases; also to exert a calming influence and to remove anger and discord. In the same way yellow stones were prescribed for the cure of biliousness, jaundice and other diseases of the liver. Green stones were used to relieve diseases of the eye. One of the earliest references in the Greek writings (Theophrastus, who wrote in the third century before Christ) is concerned with the use of the *emerald* for its beneficial effect on the eyes. The *sapphire*, the *lapis lazuli* and other blue stones, possessing the hue of the heavens, were believed to exert a tonic influence, to counteract the spirits of darkness, and to procure the aid of the spirits of light and wisdom. These gems were looked upon as emblems of chastity, and for this reason the sapphire came to be regarded as especially appropriate for ecclesiastical rings. Purple stones, like the *amethyst*, were supposed to counteract the effects of overindulgence in alcoholic beverages, a use probably suggested by the color of certain wines.

The *diamond* was considered an efficacious antidote for poisons. In the time of Alfonso X this gem was used for diseases of the bladder but only in desperate cases. It was employed also as a protection against plague and pestilence—proof, the plague attacked the poorer classes, sparing the rich who could afford to adorn themselves with diamonds. During the fifteenth century it was even a cure for insanity. In the *Babylonian Talmud* one reads of the marvelous stone belonging to Abraham, perhaps a diamond, possibly a pearl, which cured the sick who looked upon it. The Hindus believed that diamonds of inferior quality were dangerous to use. When Pope Clement XII was seized by his last illness, in 1534, his physicians resorted to powders composed of various precious stones, including diamonds. This stone was used also to detect poisons, for, it was said that on coming in contact with the poison, the diamond grew dark.

Another antidote for poisons and for infected wounds was the *emerald*. It was employed also against demoniacal possession. Worn about the neck it cured "Semitertian" fever and epilepsy. Its uses for relieving eye diseases have been mentioned. The emerald was looked upon as a certain cure for dysentery if one stone was worn in contact with the abdomen, and another placed in the mouth. In the form of a poultice it was used as a remedy for leprosy, and pulverized was administered internally as a powder for hemorrhages. The Hindus of the thirteenth century considered it a good laxative; also as an agent for stimulating the appetite, diminishing the secretion of bile and checking dysentery. Gastric troubles were "cured" by laying the stone on the stomach. The wearer of the stone was protected from the attacks of venomous creatures, and evil spirits were driven from the place where emeralds were kept.

In ancient times the *jade* was considered of great value and aid in parturition. The American Indians used the stone for diseases of the kidneys, and by the middle of the seventeenth century the curative powers of the stone for various forms of renal calculi were generally admitted. In China, jade is still the most favored stone, and wonderful therapeutic virtues have been accorded it. An old Chinese encyclopedia (1596) records the uses of jade, when reduced to a powder the size of rice grains, in strengthening the lungs, the heart and the vocal organs; also to prolong life, more especially if gold and silver were added to the jade powder. Another method advised by the Chinese was to drink the so-called "Divine Liquor of Jade," made of equal parts of jade, rice and dew-water, which were placed in a copper pot, boiled and filtered. This remedy was said to strengthen the muscles and make them supple, to harden bones, to calm the mind, to enrich the flesh and to purify the blood. Whoever took it for a long space of time ceased to suffer from heat or cold, and no longer felt either hunger or thirst. Galen (130 A. D.) attested to the virtues of the *green jasper*, stating that it aids the stomach and navel by contact, and recording his own experiences with the remedy. The stone was used against spiders and scorpions, to check the flow of blood, to strengthen the chest and lungs, to cure fever and dropsy and to improve the sight.

Sanskrit medical literature, as represented by Naharari, a physician of Cashmere who wrote in the thirteenth century, presents the *ruby* as a valuable remedy for flatulency and biliousness. He writes also of the value of a "Ruby Elixir" if properly compounded, but this elixir seems to have had little in common with the ruby except its color. The ruby was used as an amulet against plague, poison, evil thoughts and nightmare. It was supposed to divert the mind from sadness and sensuality, and to forewarn the wearer of the approach of any misfortune by the loss of color.

William Langley's "Vision of William Concerning Piers the Plowman," written about 1377 and one of the earliest specimens of English literature, contains mention of the *sapphire* as a cure for disease. Richard Preston, "a citizen and grocer of London," in 1391, gave a sapphire to the Shrine of St. Erkinwald, in Old Saint Paul's, to be kept for the cure of diseases of the eyes, stipulating that proclamation should be made of its remedial virtues. It was employed also as an eye-stone for the removal of foreign bodies from the eye, to cure plague boils, carbuncles and headaches, to prevent evil and impure thoughts, to give color to the cheeks, to provide rest and refreshment for the body, to bestow strength and energy, to soften anger, to free from enchantment and to obtain release from captivity.

St. Hildegard recommended the *topaz* to cure dimness of vision. The stone was placed in wine for three days and nights. On retiring, the patient rubbed his eyes with the moistened topaz so that the moisture lightly touched the eyeball. After the stone had been removed at the end of the third day, the wine was used for

five days. A Roman physician of the fifteenth century was reputed to have wrought many wonderful cures of those stricken with the plague, through touching the plague sores with a topaz which had belonged to two Popes, Clement VI and Gregory II. The stone was used to cure insanity, check hemorrhage, cure hemorrhoids, to avert sudden death and to restrain anger and desire.

The Spaniards and American Indians used the *bloodstone* to check hemorrhages.

The best results were supposedly obtained by first dipping the stone in cold water, and then holding it in the right hand. The Indians carved the stone into heart-shaped forms. Robert Boyle, in his essay "About the Origin and Virtues of Gems" (London, 1672), tells of a gentleman of his acquaintance who was much afflicted with bleeding of the nose. A gentlewoman sent to him a bloodstone, directing him to wear it suspended from his neck, and from the time he put it on he was no longer troubled with this malady. It was thought that this stone rendered one proof against poison, endowed with the gift of prophecy, brought long life and cured disorders of the stomach.

The *pearl* was considered a cure for insanity and other mental diseases, for leprosy and skin diseases; also as a check for bleeding, and an agent to strengthen the body and add lustre to the eye. It was conducive to contentment of body and soul. By others it was believed unlucky.

The idea that the *opal* brings bad luck is based on Teutonic superstition, and is comparatively modern. It was valued as a remedy for diseases of the eye, to stimulate the heart, to protect against contagious and infectious diseases, to prevent heart disease and malignant affections and to drive away despondency.

The *turquoise* "preserved" the wearer from injury through accident. In the presence of poison this stone was reputed to sweat profusely. Its color pales as its owner sickens, and is lost entirely on his death, to be recovered only on becoming the property of a healthy person. This gem was thought to be particularly effective in diseases of the head and heart.

The *amber* was said to change color with the state of the wearer's health; to prevent illness in general, but especially effective against diseases of the throat. The *amethyst* was accredited with the power of dispelling sleep, sharpening the intellect, preventing intoxication, protecting against sorcery and bringing victory to soldiers. The *coral* was considered a protection against poison, plague, storm, fear, sorcery and evil spirits; by change of color it warned of the approach of diseases.

The *beryl* "cured" leprosy and diseases of the throat, jaws and head; it rendered its owner cheerful, and preserved and increased conjugal love. The *agate* protects against venomous things, quenches thrist, repels storms, sharpens sight, increases strength, imparts graciousness and eloquence and prevents contagion. *Jet* was considered efficacious for removing spells and enchantments. The *lodestone* prevents and cures cramps, colic and rheumatism, and is used by voodoo priests as a love charm and to increase physical strength. The *moonstone* also is a potent love charm, as well as an aid to memory and a "cure" for leprosy. Another "cure" for leprosy is the *onyx*, which in addition was supposed to be a powerful aphrodisiac, to hasten childbirth, to increase the flow of saliva in children, to produce nightmares and to stir up strife. The *garnet* confers and preserves good health, drives away vain thoughts, reconciles differences between friends and lovers, strengthens the heart and brings wealth and honor. The *sardonyx* renders its possessor virtuous, agreeable and cheerful.

PROCEEDINGS OF THE LOCAL BRANCHES

"All papers presented to the Association and Branches shall become the property of the Association with the understanding that they are not to be published in any other publication prior to their publication in those of the Association, except with the consent of the Council." —Part of Chapter VI, Article VI of the By-Laws.

ARTICLE III of Chapter VII reads: "The objects and aims of local branches of this Association shall be the same as set forth in ARTICLE I of the Constitution of this body, *and the acts of local branches shall in no way commit or bind this Association, and can only serve as recommendations to it.* And no local branch shall enact any article of Constitution or By-Law to conflict with the Constitution or By-Laws of this Association."

ARTICLE IV of Chapter VII reads: "Each local branch having not less than 50 dues-paid members of the Association, holding not less than six meetings annually with an attendance of not less than 9 members at each meeting, and the proceedings of which shall have been submitted to the JOURNAL for publication, may elect one representative to the House of Delegates."

Reports of the meeting of the Local Branches shall be mailed to the Editor on the day following the meeting, if possible. Minutes should be typewritten with wide spaces between the lines. Care should be taken to give proper names correctly and manuscript should be signed by the reporter. *Please advise us of changes in Roster and mail reports promptly.*

BALTIMORE.

The April meeting of the Baltimore Branch, AMERICAN PHARMACEUTICAL ASSOCIATION, was held on Thursday evening, April 23, 1936, at the School of Pharmacy of the University of Maryland. Some sixty-odd members and guests were present; the members of the Local Branch being the guests of the faculty of the School on this occasion.

An interesting program had been arranged by Dean DuMez, with two speakers scheduled to address the members on timely subjects, and with a late luncheon being served at the conclusion of the meeting.

The meeting was called to order by President Hewing. The minutes of the previous meeting were read by the secretary, and were approved as read.

The first speaker to be introduced was Dr. Glenn L. Jenkins, Professor of Pharmaceutical Chemistry in the School of Pharmacy, and a member of the Revision Committee of the National Formulary VI. Dr. Jenkins spoke on the new National Formulary.

In his introductory remarks, Dr. Jenkins commented on the part played by pharmacists from Maryland in the preparation of the original and subsequent editions of the National Formulary. He recalled that the late Dr. Charles Caspari, for many years Professor of Pharmacy and Dean of the faculty of the College, had been a member of both the original National Formulary Committee and of the two Committees of Revision of subsequent editions. The late Henry P. Hynson and H. Englehardt were other Baltimoreans on the earlier Committees of Revision.

In a brief historical review of the National Formulary it was pointed out that this work was first undertaken by the AMERICAN PHARMACEUTICAL ASSOCIATION as a service to retail pharmacists, and had no official or legal status. The first official recognition of this work accorded by Congressional enactment came when the fourth edition, published in 1916, was adopted as a book of national standards. The speaker expressed the thought that the principal basis for our claim to professional standing to-day must rest on the scientific achievements and unselfish professional accomplishments of able pharmacists which are reflected in the pages of the U. S. P. and National Formulary. Our progress toward professional ideals and standards through past years has been mirrored in these two volumes.

Dr. Jenkins sketched the organization set-up of the N. F. Committee, the Sub-Committees and the Auxiliary Committees engaged in the work of revision, and illustrated the procedure involved in setting up a monograph in the N. F. The enormous amount of work represented in the revision of a single monograph of this publication, as shown by exhibits, caused most of us to revise our ideas regarding the task faced by the Revision Committee. Engendered, also, was a new appreciation of the value to us of this volume.

After discussing the general principles which guided the Committee in its work, and certain changes in scope and policy adopted in the latest revision, the speaker took up the question of

admissions to the N. F. VI. The extensive surveys made to determine the extent of actual use of all drugs and preparations proposed for admission were mentioned, and the requirements for admission discussed. An interesting feature of this address by Dr. Jenkins consisted of numerous charts and tables showing the varying extent of use, over a period of years, of the various classes of pharmaceutical preparations which have been included in the U. S. P. and N. F. These charts were projected on a screen, and trends in use pointed out in connection with his discussion of additions and deletions appearing in the sixth edition of the Formulary.

The second speaker of the evening was Mr. Marvin J. Andrews, Assistant Professor of Pharmacy in the School. Professor Andrews discussed the present status of "U. S. P. and N. F. Propaganda."

Prior to the meeting, Professor Andrews had assembled for inspection an extensive array of pamphlets and other printed matter being used in the several states and cities in which localized efforts have been made to popularize and increase the use of U. S. P. and N. F. drugs and preparations by physicians. In discussing these efforts and the results obtained by the several methods of promotion, it was pointed out that the methods adopted in Maryland were now being introduced into some other states. Numerous inquiries have been received, and copies of the printed forms used here are being requested by other pharmaceutical organizations interested in the promotional work being carried on here. Actual results obtained in Maryland to date appear to be better than can be demonstrated as attending some of the efforts put forth in other states.

The speaker stated that organized promotional efforts are now being carried out in fourteen states; with the probability existing that several other states would join this movement in the near future. He also stated that the Maryland Committee, of which he is chairman, had arranged for coöperation with a committee from the State Dental Association in promoting interest in prescribing, and the use of U. S. P. and N. F. products.

Informal discussion followed both addresses, with the speakers clearing up points for several members.

Under the heading of new business President Hewing called for an expression on the part of members as to the advisability of holding a proposed social session during the month of May. The consensus of opinions expressed inclined to the view that due to the imminence of other scheduled pharmaceutical gatherings, and Commencement exercises at the School, such a meeting might not attract sufficient attendance to prove successful.

In the course of above discussion the proposal was advanced by Dr. Dunning that future meetings of the Baltimore Branch should all be held at the School of Pharmacy building, instead of at the down-town hotel in which meetings have been held for a number of years. Dr. Dunning recalled the thought which he had expressed at one of the earlier meetings this year, when the question of poor attendance was being discussed, to the effect that meetings might profitably be made less formal by the inclusion of a supply of some light refreshments to be enjoyed by members at the conclusion of all regular business sessions. Such a procedure had helped to popularize the meetings of the local chapter of the American Chemical Society of which he is a member, and might well prove of equal attractiveness to members of the Local A. PH. A. Branch. He also renewed his offer to personally donate an amount to cover the added cost of the refreshments served, if this would help to build up the Branch.

During the discussion which followed this proposal Dean DuMez stated that a previous invitation to the Branch to make use of the facilities of the School of Pharmacy for its meetings had not been accepted because some members preferred a more centrally located place of meeting, but that he was willing to renew the invitation if the membership so desired.

On motion of Dr. Dunning, which was seconded and carried, the members present voted to hold future meetings, for an indeterminate experimental period, at the School of Pharmacy building, located at Lombard and Greene Streets.

No further business being brought up, the meeting was adjourned, and members repaired to the dining hall to enjoy the excellent luncheon provided by our hosts. R. S. FUQUA, *Secretary*.

UNIVERSITY OF MISSISSIPPI STUDENT BRANCH.

The University of Mississippi Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION held its April meeting in the entertainment room of the University Cafeteria, April 23, 1936. On this occasion a joint meeting was arranged with the Oxford Retail Druggists.

An informal dinner, which preceded the regular meeting, was tendered by the Branch for the visitors. At this dinner about twenty-five members and visitors were present. The Cafeteria chef provided an excellent dinner which was enjoyed by all those present.

The regular meeting was called to order by President Caver. The minutes of the previous meeting of the A. PH. A. Branch were read by the secretary, and approved. C. L. Allred, chairman of the Membership Committee, called a special meeting of that committee Monday.

President Caver presented John Ward, of the Program Committee, who introduced the main speaker of the evening, Dr. J. R. Sims, who gave an interesting talk on "The Relationship between Doctors and Pharmacists." He showed how essential it is that physicians and pharmacists coöperate in every way.

Dr. Sims is well qualified to discuss this subject since he holds a pharmaceutical degree as well as that of M.D. He has had experience in both phases, having practiced and taught both medicine and pharmacy.

Peyton Jones distributed cigars, and wit added zest to the occasion.

MIDDLETON LONGMIRE, *Secretary.*

COMMITTEES OF THE UNIVERSITY OF MISSISSIPPI, STUDENT BRANCH.

Program Committee.—Joe Duckworth, *Chairman;* John Ward, George Furr. *Student Activities Committee.*—William Hossley, *Chairman;* Lee Turnage, L. A. Eaton.

Membership Committee.—C. L. Allred, *Chairman;* O. C. Grigsby, George Kealhofer.

NEW YORK.

The May meeting of the New York Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held on Monday evening, May 11, 1936 at Columbia University, College of Pharmacy.

The meeting was called to order at 8:30 P.M. by President Schaefer.

The minutes of the preceding meeting were read and approved.

The Committee on Membership presented the following applications for membership in the Branch.

Bernard Greenberg	Louis Block
George Schroder	Sam Weiss
Jack Feldman	Henry Jansen
J. J. Franz	Philip Steir
Frank Rapecis	J. J. Hammer
Raphael Tomshinsky	

Treasurer Currens reported a balance.

Chairman Lehman, of the Committee on Legislation and Education, reported as follows:

"Members are requested to send telegrams to State Senator Dunnigan urging the passage of the Feld Bill entitled 'An Act to Prevent Prohibitory Price Cutting.' Also to Speaker Ives to pass the 'Piper Bill' a companion to the above.

"Also to Speaker Ives urging the passage of the 'Dunkel Bill' to prevent the sale at wholesale to retailers who are not qualified to sell drugs having poisonous, habit-forming or deleterious qualities."

Chairman Steiger, of the Committee on the Progress of Pharmacy, reported as follows:

On Friday night, May 8th, Dr. Lyman C. Craig, of Rockefeller Foundation, read a paper on "The Alkaloids of Ergot" at the A. C. S. meeting.

In the May 1936, *Ind. and Eng. Chem.* appears a most interesting article on "Germicidal Properties of Phenolic Compounds" by Cecil G. Dunn. The following compounds were studied and compared with eight other germicidal solutions: *sec.* Amyltricresol, *o*-hydroxyphenylmercuric chloride and a mixture of the two known as mercresin.

The Chemist and Druggist, April 4, 1936—a short notice of the celebration in London on March 30th, of a "cosmetic centenary."

U. S. Patents have been issued for the following: a new uric acid solvent made by reacting a trihalogen acetic aldehyde with nitric acid.

Alkyl ethers of 4-chloro-resorcinol assigned to Lambert Pharmacal Co.

A process for converting alkali salts of phenyl alkyl barbituric acid into stable calcium compounds.

A compound for treatment of anemia comprising a neutralized solution of a highly soluble ferrous salt in water and glycerin, assigned to Chappel Bros.

A dried inorganic gel for internal use for treatment of toxemia, assigned to Davidson Chemical Co.

A practically tasteless quinine, compound. The 2,3-dihydroxy naphthalene-*o*-monoacetate of quinine. Assigned to Hoffmann-La Roche Co.

The secretary reported on a meeting of the Executive Committee. The presentation of the Remington Medal was discussed. It was decided to make the award at a banquet on June 9, 1936, if possible. The secretary was appointed as chairman of the committee in charge.

The president appointed Mr. Maistelman as chairman of a committee to study the question of ways and means of increasing attendance at the regular meetings.

The president then introduced the guest speaker of the evening, Mr. Saul Caspe, associate director of Research, Philip Morris Co., Ltd., who spoke on "The Influence of Hygroscopic Agents on Irritation from Cigarette Smoke."

The talk was a report on the results of research work performed in the laboratories of Columbia University.

The most commonly used hygroscopic agent is glycerin. The burning of glycerin, however, forms among other products, a highly irritating and toxic substance. Another hygroscopic agent is diethylene glycol.

The irritant properties of smoke from cigarettes treated respectively with glycerin and diethylene glycol were studied. A smoking machine was so constructed as to duplicate normal smoking conditions. The smoke from the cigarette is bubbled through a suitable liquid. To compare the irritant properties of the smoke some of this solution is injected into one eye of a rabbit. The resulting edema of the conjunctiva of that eye gives a measure of the irritant properties of the smoke. Based on a large number of experiments, the conclusion was reached that cigarettes in which diethylene glycol was used as the hygroscopic agent were much less irritating than cigarettes in which glycerin was used.

These tests were repeated, using several brands of cigarettes on the market with the same result, that is, the edema produced by glycerin treated cigarettes was substantially the same regardless of method of manufacture.

Clinical investigations were conducted by a number of doctors, of whom the majority were nose and throat specialists. A large number of trustworthy subjects were selected, each of whom was suffering from congestion of the nose, throat, mouth or lungs. In every case the patients had been smoking glycerin treated cigarettes. They were taken off their habitual cigarettes and given cigarettes in which diethylene glycol was used as a hygroscopic agent. Periodic examinations were made until the congestion had improved or cleared up. Then the patients were given a new supply of cigarettes, exactly the same in all respects except that they were glycerin treated instead of diethylene-glycol treated. The patients were unaware of the change. The results were conclusive, while using diethylene-glycol treated cigarettes a definite improvement was obtained. On returning to the glycerin treated cigarettes, in most cases, there was a quick return to the congested condition.

In conclusion it was stated that: "Tests on rabbits' eyes and a man's nose, throat, mouth and lungs showed conclusively that the irritation caused by smoke from diethylene-glycol treated cigarettes is much less than that from glycerin treated cigarettes.

After the speaker had finished his address, there was quite a discussion among the members on this subject. Finally a rising vote of thanks was accorded the speaker and the meeting adjourned.

HORACE T. F. GIVENS, *Secretary.*

Authors of papers for the meeting in Dallas will please send in titles and abstracts promptly.

ASSOCIATION BUSINESS

AD INTERIM BUSINESS OF THE COUNCIL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, 1935–1936.

Office of the Secretary, 2215 Constitution Ave., Washington, D. C.

LETTER NO. 22.

May 22, 1936.

To the Members of the Council:

140. Use of Text of N. F. VI. Motion No. 63 (Council Letter No. 21, page 471) has been carried and Dr. Sugar has been so advised.

Messrs. Lea and Febiger have requested permission to use the text of the N. F. VI in a revised edition of Prof. Charles H. Roger's book on pharmaceutical chemistry. Chairman DuMez writes as follows:

> "In response to your letter of the 14th, it is stated that I have gone over the proof sheets of the revised edition of Professor Roger's book on pharmaceutical chemistry which you sent me. I find that the book is not materially changed from the original and therefore recommend to the Council that he be granted permission to use portions of the text of the N. F. VI for comment, and that the same fee be charged as before."

(*Motion No. 67*) It is moved by DuMez that Lea and Febiger be granted permission to use portions of the text of the N. F. VI in a revision of a book on pharmaceutical chemistry by Charles H. Rogers, with the customary acknowledgment and at the usual fee of $5.00.

141. Corrections in N. F. VI. Motion No. 64 (Council Letter No. 21, page 472) has been carried and arrangements have been made with Mack Printing Company for the printing and distribution of the list, and for corresponding corrections in the plates before the second printing of N. F. VI.

142. Election of Members. Motion No. 65 (Council Letter No. 21, page 472) has been carried and applicants for membership numbered 336 to 349, inclusive, are declared elected.

143. Request for Additional Compensation on Account of Printing and Binding the N. F. VI. A vote is called for on Motion No. 66 (Council Letter No. 21, page 472).

Dr. Fischelis commented, and very correctly so, that any agreement to pay any sum in excess of the contract should be paid with the understanding that if during the term of the contract there are any reductions in cost, the ASSOCIATION should be credited with the decreases.

The contract provides for such adjustments, either higher or lower, and the prices including labor and materials will be checked as each printing of N. F. VI is billed. The additional compensation requested in this instance applies only to the first printing of 25,000 copies and does not change the terms of the contract or the specifications thereunder.

Dr. Dunning, although in favor of paying the additional compensation under the circumstances, inquired whether a decrease in compulsory wage would be credited to the ASSOCIATION.

No other comments were received.

144. Stock of N. F. VI. The secretary checked the report of the Mack Printing Company covering the first printing of N. F. VI, on May 19th, in Easton, Pa. 25,101 copies were printed, 21,567 copies had been sold, and 3534 copies were in stock with either the five sub-distributors, the binders or the Mack Printing Company, as covered by proper certificates. 25,000 copies were billed on January 16th and the over-run of 101 copies or less will be billed when it is determined how many copies, if any, are damaged.

145. Committee on Pharmacy Week. Chairman Hogstad appeared before the Council at its meeting on December 5, 1935, and discussed certain proposed modifications in the plan for Pharmacy Week (see Council Letter No. 10, page 1110) at which time he was requested to give the proposals further consideration and to submit them by mail at a later date.

Attached is a Suggested Plan for the Reorganization of the Pharmacy Week Movement and an accompanying letter, as submitted by Chairman Hogstad.

With respect to:

Recommendation No. 2.—The National Association of Retail Druggists has increased its 1936 appropriation for the Committee on Pharmacy Week to $500.00 (from $250.00) to match an equal increase by the A. PH. A., which provides the amount requested.

Recommendation No. 8.—Arrangements have been made to take care of correspondence and filing, as proposed.

Recommendation No. 11.—Arrangements have been made with the N. A. R. D. to prepare and issue jointly the ten Merit Certificates for retail pharmacists awarded for the 1935 Contest.

In order to bring the Suggested Plan before the Council, the following motion is offered and the members are invited to forward comments and suggestions as promptly as possible. These will be submitted in letter form and a vote on the motion will be called for later.

(*Motion No. 68*) It is moved by Kelly that the Suggested Plan for the Reorganization of the Pharmacy Week Movement, as submitted by Chairman Hogstad, be approved.

146. Applicants for Membership. The following applications, properly endorsed and accompanied with the first year's dues, have been received:

No. 350, Frank H. Overton, 4648 Hollywood Blvd., Hollywood, Calif.; No. 351, Virgil Gordon Snider, Campana Corp., Batavia, Ill.; No. 352, Joseph August Gauer, Fritzsche Bros., Inc., Chicago, Ill.; No. 353, Edward Rosendahl, 148 Lafayette St., New York, N. Y.; No. 354, Agostino Caimi, 2030 E. Willard St., Philadelphia, Penna.; No. 355, John Willard Jester, 6117 Fairhill St., Philadelphia, Pa.; No. 356, Bert S. Kleinsinger, 2601 Jerome Ave., Bronx, N. Y. C.; No. 357, James Hing Chu, 47 Mott St., New York, N. Y.; No. 358, Evelyn Leone Wall, 114 So. 7th East St., Salt Lake City, Utah; No. 359, Marion S. Alley, 1926 Eye St., N. W., Washington, D. C.; No. 360 Tony Joseph Rosetti, Box 156, University, Miss.

(*Motion No. 69*) Vote on applications for membership in the AMERICAN PHARMACEUTICAL ASSOCIATION.

E. F. KELLY, *Secretary.*

BULLETIN NO. 12, 1935, 1936. May 18, 1936.

CORRECTIONS IN THE N. F. VI.

Since the National Formulary, Sixth Edition, was issued in December 1935, many interested persons have read the book very critically, and quite a number of corrections in the text have been suggested.

These proposed corrections included simple typographical errors, a few errors in the tolerance figures for the alcoholic content of certain galenical preparations and a few changes in dose statements.

The Committee on National Formulary has given each of the suggestions very careful consideration and has compiled a list of 54 corrections to be made in the first printing of the N. F. VI, bearing official coupons with serial numbers from 100,001 to 125,000. The corrections have been approved by the Council of the AMERICAN PHARMACEUTICAL ASSOCIATION and will be made in subsequent printings of the N. F. VI.

A list of these corrections, printed on one side of the sheet, is available, without cost, and is so arranged that the sheets can be inserted in the front of the N. F. VI, or that each correction can be cut out and pasted over the wording it is to replace.

Requests for the list of Corrections in the N. F. VI may be sent to Mack Printing Company, Easton, Penna., or to the AMERICAN PHARMACEUTICAL ASSOCIATION, 2215 Constitution Avenue, Washington, D. C., and *must be accompanied by a self-addressed stamped envelope* to insure delivery.

E. F. KELLY, *Secretary.*

NATIONAL PHARMACY WEEK EXECUTIVE COMMITTEE.

To the Members of the Council of the American Pharmaceutical Association:

Attached is a suggested plan for the reorganization of the National Pharmacy Week Movement. At the request of Dr. E. F. Kelly, I presented a suggested plan at the December meeting of the Council. The present suggested plan is a modification of the plan as submitted at that time in which it will be noted that several of the features that were somewhat controversial in character have been eliminated.

In view of the fact that the time has arrived for issuing a release to the pharmaceutical press, I shall deem it a great favor if you will kindly advise as to the action of the Council on the plan as submitted at this time.

ANTON HOGSTAD, JR., *Chairman*,
National Pharmacy Week Executive Committee.

SUGGESTED PLAN FOR THE REORGANIZATION OF THE NATIONAL PHARMACY WEEK MOVEMENT.

INTRODUCTION.

The National Pharmacy Week Movement, as founded by the late Dr. Robert J. Ruth, celebrated its eleventh annual observance during the week of October 21, 1935. During the course of the past eleven years the chairmanship of this movement has been held by Robert J. Ruth, E. L. Newcomb and Anton Hogstad, Jr.

The question as to whether the National Pharmacy Week Movement should be continued in the future has been raised quite frequently by educators, retail pharmacists, association officers and others. This has received serious consideration by the National Pharmacy Week Executive Committee and the Committee feels that the Movement should be continued in the future. In spite of many handicaps the Movement has accomplished a great deal in the past and it would appear to offer many opportunities for the future, provided certain changes are made in its set-up.

During the first two or three years thousands upon thousands of retail pharmacists took an active part in the observances of the National Pharmacy Week Movement. Many of these individuals, however, conducted highly commercialized drug stores and they did not have a love of the profession at heart. They were only interested in securing the local, state and national prizes. After making two or three unsuccessful attempts, they lost interest and ceased to participate in the Movement.

There has been, therefore, during the past eleven years, a distinct settling process taking place, wherein one notes that those individuals who possess a love of the profession at heart and who are not particularly interested in prizes have taken a very active interest. This has been especially noticeable in the past two or three years, which, according to all reports, have been quite outstanding. The National Pharmacy Week Executive Committee is satisfied with these conditions, for the future of the Movement depends upon the support of the professionally inclined pharmacists.

The Committee believes that our colleges of pharmacy should take an active interest in the Movement in order to give it an academic atmosphere. It is very gratifying to note the coöperation of the deans in conducting "Open House" during Pharmacy Week, in presenting community and radio talks and in other activities. A number of colleges of pharmacy have prepared attractive professional window displays which have been featured in public libraries and in prominent community windows.

It has been deemed advisable in the light of these facts to make certain changes in the set-up of the National Pharmacy Week Movement and a discussion of the proposed modifications follows for your consideration:

Recommendation No. 1—Name.—That the present name, "National Pharmacy Week," be retained.

Many suggestions have been received relative to a possible change of name, as many object to including the word "week." It is felt, by some, that the retention of the word "week" identifies the Movement as just another week among a score of annual observances participated in by many groups.

It is our opinion, however, that the present name should be retained, for it has been firmly established in the minds of the drug-trade industry and its disadvantages can be offset, at least in part, by a constructive program.

Recommendation No. 2—Finances.—The chairman of the National Pharmacy Week Executive Committee recommended in his report presented at the 1935 Convention of the AMERICAN PHARMACEUTICAL ASSOCIATION that the sum of $1000.00 be furnished the Committee annually to carry on the work of the National Pharmacy Week Movement. To date this Committee has received but $500.00 per year, which has been found quite inadequate.

Many persons have suggested that a fund be established by appealing to manufacturers, but this has been deemed inadvisable.

Recommendation No. 3—National Pharmacy Week Executive Committee Membership.—That the president of the AMERICAN PHARMACEUTICAL ASSOCIATION appoint a committee of seven members, including two representatives of the National Association of Retail Druggists, to continue to be known as "The National Pharmacy Week Executive Committee."

Recommendation No. 4—International in Scope.—That the AMERICAN PHARMACEUTICAL ASSOCIATION, through its National Pharmacy Week Committee, encourage pharmaceutical associations throughout the world to observe an annual Pharmacy Week. During the next few months the chairman of the Committee will enter into correspondence with the presidents or secretaries of all foreign pharmaceutical associations to ascertain whether or not these associations sponsor Pharmacy Week movements, and if not will encourage them to do so.

Recommendation No. 5—Stationery.—That the National Pharmacy Week Committee employ the official stationery of the AMERICAN PHARMACEUTICAL ASSOCIATION, with such modifications as are deemed necessary relative to the names of committees, etc., and that the names of foreign pharmacy week committees be included on the Pharmacy Week stationery.

Recommendation No. 6—National Pharmacy Week Executive Office.—That the activities of the National Pharmacy Week Executive Committee be conducted from the AMERICAN INSTITUTE OF PHARMACY at 2215 Constitution Avenue, Washington, D. C., instead of from the present office at Rahway, New Jersey. At the present time it is indicated on the stationery that the office is at 2215 Constitution Avenue and all correspondence is relayed to Rahway, New Jersey.

Recommendation No. 7—Fund for Executive Office.—That the President of the AMERICAN PHARMACEUTICAL ASSOCIATION appoint a committee of five to raise a fund for the purpose of furnishing this office.

Recommendation No. 8—Part-Time Secretary for Executive Office.—That the AMERICAN PHARMACEUTICAL ASSOCIATION provide the National Pharmacy Week Committee with necessary secretarial service to attend to correspondence and filing in the Pharmacy Week Office.

Recommendation No. 9—Window Display Contest.—That the National Pharmacy Week Window Display Contest be continued in the future in accordance with the suggestions set forth under "Rules of Contest."

Recommendation No. 10—Prizes.—That three prizes be offered in connection with the National Pharmacy Week Window Display Contest as follows:

1. Federal Wholesale Druggists' Association Robert J. Ruth Memorial Trophy for the best professional window display prepared and featured by a retail pharmacist.

2. An attractive banner and stand, presented by the AMERICAN PHARMACEUTICAL ASSOCIATION, for the best professional window display prepared and featured by a local, county or state pharmaceutical organization.

3. An attractive banner and stand, presented by the AMERICAN PHARMACEUTICAL ASSOCIATION, for the best professional window display prepared and featured by a reputable school or college of pharmacy.

Recommendation No. 11—Merit Certificates.—That the practice of the AMERICAN PHARMACEUTICAL ASSOCIATION and the National Association of Retail Druggists of awarding merit certificates jointly for the ten next-best window displays prepared by retail pharmacists be continued, with three additional certificates for the three next-best displays prepared by local, county or state pharmaceutical organizations and three certificates for the three next-best displays prepared by reputable schools or colleges of pharmacy.

Recommendation No. 12—Advisory Committee.—That the present Advisory Committee consisting of the presidents and secretaries of state pharmaceutical associations be retained.

Recommendation No. 13—Coöperating Groups.—That the following groups coöperate with the National Pharmacy Week Executive Committee:

1. National Association of Retail Druggists.
2. American Association of Colleges of Pharmacy.
3. National Conference on Pharmaceutical Research.
4. National Association of Boards of Pharmacy.
5. National Wholesale Druggists' Association.

6. Federal Wholesale Druggists' Association.
7. American Pharmaceutical Manufacturers' Association.
8. American Drug Manufacturers' Association.
9. Editors of United States Pharmaceutical Journals.

Recommendation No. 14—Presidential Broadcast.—That the President of the AMERICAN PHARMACEUTICAL ASSOCIATION deliver an annual Pharmacy Week message over a national hook-up on the Saturday or Sunday evening prior to the inauguration of Pharmacy Week, it being understood that the arrangements for this broadcast will be made by the Chairman of the National Pharmacy Week Executive Committee.

Recommendation No. 15—Pharmaceutical Press.—That the pharmaceutical press be asked to continue the splendid support it has furnished the National Pharmacy Week Movement in the past and that editors be encouraged to issue special Pharmacy Week issues of pharmaceutical journals.

Recommendation No. 16.—That the National Wholesale Druggists' Association be encouraged to prepare and distribute Pharmacy Week Maps as they have been doing in former years.

Recommendation No. 17—Professional in Character.—That members of the drug-trade fraternity, through the agency of bulletins, pharmaceutical press, talks, etc., be urged to keep the Pharmacy Week Movement strictly professional at all times.

Recommendation No. 18—Radio Committee.—That the president of the AMERICAN PHARMACEUTICAL ASSOCIATION appoint a committee of three members, to be known as the AMERICAN PHARMACEUTICAL ASSOCIATION Radio Committee, the purpose of the committee being to make a study of radio programs, especially those in connection with the Pharmacy Week Movement, and to prepare a constructive report on pharmaceutical radio programs.

Recommendation No. 19—Pharmacy Week Exhibit at Conventions of the American Pharmaceutical Association.—That the chairman of the National Pharmacy Week Executive Committee appoint a committee whose duty shall be to prepare a professional exhibit, to be known as the "Pharmacy Week Exhibit," at the annual conventions of the AMERICAN PHARMACEUTICAL ASSOCIATION.

Recommendation No. 20—Pharmacy Week Brochure.—That the National Pharmacy Week Executive Committee prepare and distribute a Pharmacy Week booklet containing necessary information relative to the annual observance.

Recommendation No. 21—Monthly National Pharmacy Week Bulletin.—That the National Pharmacy Week Executive Committee prepare and release to the pharmaceutical press monthly mimeographed bulletins, to encourage retail pharmacists to greater professional activity and to inform them of matters pertaining to the Pharmacy Week Movement.

Recommendation No. 22—Pharmacy Week Human-Interest-Appeal Stories.—That owing to the wide-spread interest in the mimeographed human-interest-appeal stories as released by the National Pharmacy Week Executive Committee in the past, the Committee enlarge upon this phase of Pharmacy Week activities by increasing the number of these stories and by charging 5¢ per copy post-paid, if found necessary.

Recommendation No. 23—State, County and Local Pharmacy Week Committees.—That the National Pharmacy Week Executive Committee arrange for state, county and local Pharmacy Week committees through state, county and local pharmaceutical organizations.

Recommendation No. 24—Newspaper Editorials.—That the National Pharmacy Week Executive Committee arrange for the preparation and distribution of a series of editorials relative to Pharmacy Week for daily and weekly newspapers.

Recommendation No. 25—High School Essay Contests.—That the National Pharmacy Week Executive Committee encourage high school essay contests throughout the United States and that a Pharmacy Week Essay Contest Committee be appointed by the Chairman of the National Pharmacy Week Executive Committee.

Recommendation No. 26—Greetings to Associations Assembled in Conventions.—That night letters be telegraphed to secretaries of the following associations when in convention to extend greetings and to stimulate interest in Pharmacy Week activities:

1. National Association of Retail Druggists.
2. National Association of Wholesale Druggists.
3. Federal Wholesale Druggists' Association.
4. American Pharmaceutical Manufacturers' Association.
5. State Pharmaceutical Associations.
6. American Drug Manufacturers' Association.

Recommendation No. 27—Rules of Contest.—Rule No. 1: The Contest is open to the following:

Class I—Retail pharmacists who are proprietors of one or more retail drug institutions maintaining prescription departments.

Class II—Local, county and state pharmaceutical associations.

Class III—Colleges of pharmacy.

Rule No. 2: Class I—The display must be featured by a proprietor of a retail pharmacy maintaining a prescription department. The display must be featured in one of the window display spaces.

Class II—The display must be exhibited in a prominent and suitable display space which is not maintained by a member or members of the drug-trade fraternity, such as retail drug stores and wholesale drug houses.

Class III—The display must be featured in a prominent and suitable display space which is not maintained by a member or members of the drug-trade fraternity, such as retail drug stores and wholesale drug houses.

Rule No. 3: All displays must be strictly professional, depicting one or more aspects of the profession of pharmacy; *i. e.*, the romance of pharmacy, scientific achievements, pharmacy in relation to public health, pharmaceutical education and the pharmacist and the law.

Rule No. 4: The display must be conceived and developed by or under direction of the individual or group entering it in the contest.

Rule No. 5: A photograph of any display previously submitted in a local, county, state or national Pharmacy Week contest will be declared ineligible.

Rule No. 6: Displays should be as free as possible from advertising material and trade packages and will be judged accordingly.

Rule No. 7: A photograph or photographs of displays should be as free as possible from commercial advertisements either on the interior or exterior of the institution.

Rule No. 8: Photographs submitted should be, if possible, 8 x 10 inches in size and should be made by a commercial photographer.

Rule No. 9: All photographs submitted will become the property of the AMERICAN PHARMACEUTICAL ASSOCIATION for its historical records. No photographs will be returned.

Rule No. 10: Photographs will be judged according to the following points:

(*a*)	Interpretative thought	10 points
(*b*)	Human-interest appeal	10 points
(*c*)	Balance, harmony, color scheme	10 points
(*d*)	Educational value	10 points
(*e*)	Professional value	10 points
(*f*)	Conciseness and clarity of expression	10 points
(*g*)	Value to pharmacy from allied professional point of view	10 points
(*h*)	Originality	10 points
(*i*)	Technical accuracy	10 points
(*j*)	Ownership of materials	10 points
	Possible Total	100 points

Rule No. 11: Photographs should be accompanied by a letter of transmittal on the stationery of the contestant and the letter should bear the signature of the contestant.

Rule No. 12: Class I—Photographs and letter of transmittal should be mailed to the secretary of the respective state pharmaceutical association on or before November 15th of the current year.

Class II—Photographs and letter of transmittal should be mailed to the secretary of the respective state pharmaceutical association on or before November 15th of the current year.

Class III—Photograph and letter of transmittal should be mailed to the secretary of the respective state pharmaceutical association on or before November 15th of the current year.

Rule No. 13: Photographs of displays entered in the contest should not appear in the pharmaceutical press until the report of the Contest Committee is announced by the chairman of the National Pharmacy Week Executive Committee.

ANTON HOGSTAD, JR., *Chairman,*
National Pharmacy Week Executive Committee.

Concluded from page 460, May Journal, A. Ph. A.

TABLE FOR ADJUSTMENT OF ISO-ALCOHOLIC ELIXIR, N. F. VI.*[1]

Low-Alcoholic Elixir.	High-Alcoholic Elixir.	Suitable as Vehicle for Preparations of the Following Alcoholic Strengths.
1 volume	None	0–10 per cent
4 volumes	1 volume	10–20 per cent
3 volumes	1 volume	20–30 per cent
2 volumes	1 volume	30–40 per cent
1 volume	1 volume	40–50 per cent
1 volume	2 volumes	50–60 per cent
1 volume	3 volumes	60–70 per cent
1 volume	4 volumes	70–80 per cent
None	1 volume	80–95 per cent

* For Prescription department.

[1] Issued by the U. S. P.-N. F. Publicity Committees of the Maryland Pharmaceutical Association and Baltimore Retail Druggists' Association.

NOTE: Iso-Alcoholic Elixir is intended to serve as a general vehicle for various medicaments that require solvents of different alcoholic strengths. When, therefore, Iso-Alcoholic Elixir is specified in a prescription, that proportion of its two ingredients is to be used that will produce a perfect solution.

For liquid galenicals, the alcoholic strength of Iso-Alcoholic Elixir to be used is approximately the same as that of the menstruum or solvent employed in the preparation of the galenical.

When galenicals of different alcoholic strengths are used in the same prescription, the Iso-Alcoholic Elixir to be used is to be of such alcoholic strength as to secure the best solution possible under the circumstances. This will generally be found to be the average of the alcoholic strengths of the several ingredients.

For non-extractive substances, the lowest alcoholic strength of Iso-Alcoholic Elixir that will yield a perfect solution should be chosen.

ALCOHOLIC STRENGTH OF FREQUENTLY USED FLUIDEXTRACTS, SPIRITS AND TINCTURES.

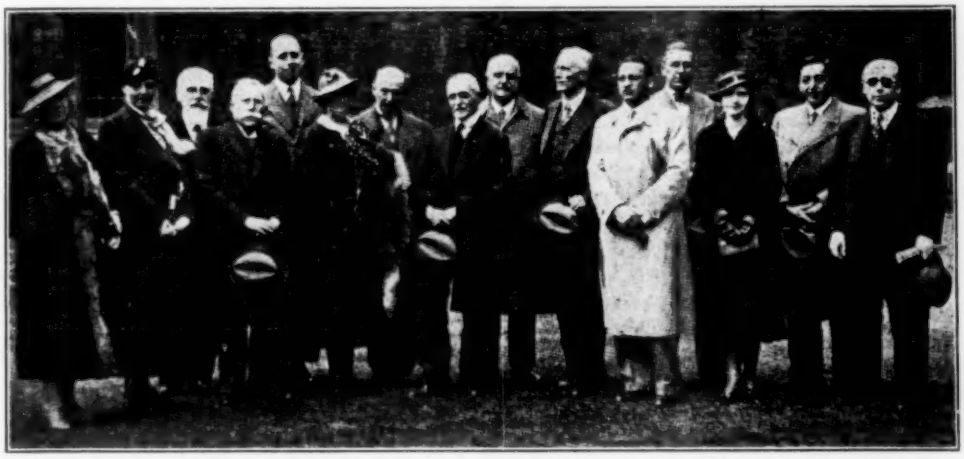
Fluidextractum.	U. S. P. Fluidextracts Alcoholic Content.	Average Dose.
Cannabis	75–85%	0.1 cc.– 1½ minims.
Cascaræ Sagradæ	20–24%	1 cc.– 15 minims.
Cascaræ Sagradæ Aromaticum	17–19%	2 cc.– 30 minims.
Ergotæ	37–42%	2 cc.– 30 minims.
Glycyrrhizæ	20–24%	2 cc.– 30 minims.
Ipecacuanhæ	28–33%	0.06 cc.– 1 (Expectorant)
		1 cc.– 15 (Emetic)
Sarsaparillæ	37–42%	2 cc.– 30 minims.
Zingiberis	69–76%	0.6 cc.– 10 minims.
Fluidextractum.	**N. F. Fluidextracts.**	
Aconiti	60–66%	0.06 cc.– 1 minim.
Belladonnæ Folii	57–63%	0.06 cc.– 1 minim.

Buchu	71–78%	2 cc.– 30 minims.
Cimicifugæ	71–78%	1 cc.– 15 minims.
Colchici Cormi	51–57%	0.25 cc.– 4 minims.
Colchici Seminis	53–58%	0.2 cc.– 3 minims.
Gossypii Radicis Corticis	71–78%	2 cc.– 30 minims.
Grindeliæ	57–63%	2 cc.– 30 minims.
Hydrastis	51–57%	2 cc.– 30 minims.
Hyoscyami	57–63%	0.2 cc.– 3 minims.
Lobeliæ	36–42%	0.1 cc.– 1½ minims.
Rhei	55–63%	1 cc.– 15 minims.
Sarsaparillæ Compositum	32–38%	2 cc.– 30 minims.
Senegæ	51–57%	1 cc.– 15 minims.
Valerianæ	61–68%	1 cc.– 15 minims.
Viburni Opuli	51–57%	2 cc.– 30 minims.
Tinctura.	U. S. P. Tinctures.	
Aconiti	65–70%	0.6 cc.– 10 minims.
Belladonnæ	65–70%	0.6 cc.– 10 minims.
Capsici	80–85%	0.5 cc.– 8 minims.
Cardamomi Composita	45–47%	4 cc.– 60 minims.
Cinchonæ Composita	56–62%	4 cc.– 60 minims.
Colchici Seminis	59–63%	2 cc.– 30 minims.
Digitalis	67–72%	1 cc.– 15 minims.
Ferri Chloridi	58–64%	0.6 cc.– 10 minims.
Gentianæ Composita	43–47%	4 cc.– 60 minims.
Hyoscyami	65–69%	2 cc.– 30 minims.
Nucis Vomicæ	67–72%	1 cc.– 15 minims.
Opii	17–19%	0.6 cc.– 10 minims.
Opii Camphorata	43–46%	4 cc.– 60 minims.
Rhei Aromatica	43–46%	4 cc.– 60 minims.
Scillæ	64–67%	1 cc.– 15 minims.
Stramonii	64–70%	0.75 cc.– 12 minims.
Valerianæ	66–70%	4 cc.– 60 minims.
Tinctura.	N. F. Tinctures.	
Aloes	44–48%	2 cc.– 30 minims.
Asafœtidæ	78–85%	1 cc.– 15 minims.
Calumbæ	58–62%	4 cc.– 60 minims.
Cannabis	85–90%	1 cc.– 15 minims.
Cimicifugæ	79–85%	4 cc.– 60 minims.
Gelsemii	70–75%	0.3 cc.– 5 minims.
Guaiaci	78–82%	4 cc.– 60 minims.
Guaiaci Ammoniata	58–64%	2 cc.– 30 minims.
Hydrastis	57–63%	8 cc.–120 minims.
Lobeliæ	44–47%	1 cc.– 15 minims.
Sanguinariæ	66–72%	1 cc.– 15 minims.
Strophanthi	88–92%	0.5 cc.– 8 minims.
Valerianæ Ammoniata	62–65%	2 cc.– 30 minims.
Spiritus.	U. S. P. Spirits.	
Æthylis Nitritis	85–93%	2 cc.– 30 minims.
Ammoniæ Aromaticus	62–68%	2 cc.– 30 minims.
Camphoræ	80–87%	1 cc.– 15 minims.
Chloroformi	85–91%	2 cc.– 30 minims.
Glycerylis Trinitratis	88–95%	0.06 cc.– 1 minim.
Menthæ Piperitæ	79–85%	1 cc.– 15 minims.
Menthæ Viridis	79–85%	1 cc.– 15 minims.
Spiritus.	N. F. Spirits.	
Ætheris	60–65%	4 cc.– 60 minims.
Ætheris Compositus	58–63%	4 cc.– 60 minims.

THE INTERNATIONAL PHARMACEUTICAL FEDERATION. MEETING OF THE BUREAU.

Meetings of the International Committee on Specialties and of the International Pharmaceutical Federation were held at Cambridge (England) during the last week of May; nine countries were represented by delegates. We are taking the liberty of abstracting from the report in the *Pharmaceutical Journal* of June 6th.

Chairman L. van Itallie presided over the three sessions of the Commission on Specialties. A new edition of the treatise on methods of analysis of proprietary medicines is to be published in German; another volume on a scheme for carrying out the methods of analysis is under consideration; the Commission also agreed to compile information on research which had been done on thermostability of chemicals used for injection.



Left to Right: Mrs. Rising (Stockholm), Mme. Höst Madsen, M. G. Barthet (Paris), Prof. L. van Itallie (Leyden), Dr. T. Potjewijd (The Hague), Mme. Heressey, Prof. Dr. H. Heressey (Paris), Mr. E. Saville Peck, Dr. J. J. Hofman (The Hague), Dr. E. Höst Madsen, President (Copenhagen), Dr. A. Schmierer (Berlin), Herr. Genicker, Mme. Chalmeta, Dr. Weis (Vienna), Prof. Chalmeta (Madrid).—*The Pharmaceutical Journal.*

President Dr. Höst Madsen presided at the sessions of the Bureau; the work accomplished and that for future investigations was discussed. "Dispensatorium Danicum," of Danish pharmacists, is issued to doctors as a guide to prescribing galenicals and pharmacopœial chemicals.

The Bureau has obtained information on the practice of pharmacy and now will investigate the legal responsibilities of the pharmacists and the practice in countries represented in the Federation. The 25th anniversary meeting of the Federation will be held in Copenhagen in August or September of 1937.

PENNSYLVANIA ASSOCIATION.

The Association met in Philadelphia at the Bellevue Stratford; an extensive exhibit was a feature. Among the speakers were: Mercer B. Tate, Jr., on "Fair Trade and Its Legal Aspects;" Edward J. Hughes, on "Diversity in the Practice of Pharmacy;" E. Fullerton Cook, on "U. S. P. XI, and Relationship to Other Books of Standards;" Noel E. Foss, on "Chemical Phases That Pharmacists Should Know Regarding New Pharmacopœial Products;" Adley B. Nichols, on "Scope and Value of the National Formulary to the Practicing Physician and Dentist;" Louis Saalbach on "Value of the National Formulary to the Pharmacist;" H. Evert Kendig, on "Practical Uses of the U. S. P. and N. F. from the Viewpoint of the Physician;" Rowland Jones, on "National Legislation."

A series of valuable papers and a symposium on Vitamins featured the annual event.

President Harry E. Wertz presided at the banquet, Dr. Wilmer Krusen was toastmaster and Congressman Wright Patman, speaker of the occasion. Guests of Honor were: Mayor Davis Wilson, Chief Justice John W. Kephart, Mrs. Lucretia Blankenburg, Robert P. Fischelis, Rowland Jones, Jr., E. F. Kelly, Mercer B. Tate, Jr., George C. Yeager.

EDITORIAL NOTES

SENATE BILL 4390 NOW ON CONSENT CALENDAR.

The *Calendar* of June 18th reports that S. 4390 has been placed on the "Consent Calendar," and it is reasonable to assume that the Bill, which provides commissions for 16 pharmacists, will be enacted before the close of Congress. This is a forward step in the advancement of pharmacists for which the AMERICAN PHARMACEUTICAL ASSOCIATION has been working for years. See April JOURNAL, page 380, May number, pages 477, 478 and 479.

The **Sheppard Bill** was finally passed on June 19th. It provides, as stated, for commissioning 16 graduate pharmacists as second lieutenants.

The **Robinson-Patman Bill** was passed and signed by the President.

In the closing rush of Congress (June 20th) the **Food and Drugs Bill** was killed when the House refused to agree to the conference report. The battle for passage of the legislation was led by Chairman Rayburn (Texas) of the Interstate Commerce Committee.

The AMERICAN PHARMACEUTICAL ASSOCIATION restated its belief at Portland that the present food and drugs act is too limited in its scope to afford the public the proper protection in the matter of food and drugs and cosmetics, and that the ASSOCIATION endorse the bill now before Congress known as S-5 substantially in the form in which it passed the Senate and urge its prompt enactment, and its officers are instructed to coöperate as fully as possible with all other agencies having this end in view, and that a copy of this resolution be immediately sent to the chairmen of the committees having the bill in charge. Every effort in that direction was made by the ASSOCIATION to secure enactment which failed as stated above, after favorable action had previously been taken by the Senate and House on this important legislation.

VISIT TO CITY OF MEXICO.

G. G. Colin, member of the AMERICAN PHARMACEUTICAL ASSOCIATION, in Mexico, writes that if any pharmacists wish to visit Mexico he would like to be advised of the names of the visitors, the number and approximate date of their arrival. He will be glad to help in securing hotel reservations. Those wishing to drive by the Mexico-Laredo Road may obtain information at the border from Association Automovilistica Mexicana.

UNDER SIX FLAGS.

"Beautifully impressive is the ceremony first staged June 6, 1936, at the Texas Centennial Central Exposition, where the six flags under which Texas has served were flung to the breeze. Wisely the Centennial management has elected to maintain the flag raising throughout the period of the exposition. With the formal retreat and guard mount ceremonies of the military and naval units, the flag-raising will become a colorful remembrance for every visitor.

"The six flags play an important and attractive part in the decorative plan of the entire exposition. The huge banners floating in the breeze on the esplanade remind every spectator that here is a State that was once a colony of two great nations, part of Mexico, an independent Republic and a commonwealth in two Republics."

THE ADDICTION TO CODEINE.

In a comprehensive article in the *Medical Record* for May 20th, Iwan Ostromislensky places codeine among the group of opiates causing addiction. He concludes his article by saying: "The symptoms of withdrawal in codeine and in morphine addicts are substantially the same." Terry's report and Himmelsbach's recently published observations show the symptoms do not differ materially, not only in their nature, but also in their intensity. Comment is made because the report differs from that quite generally accepted. In the body of the paper, it is stated, that "in moderate doses codeine can be injected daily in the organism of a man over a much longer period of time than can morphine without creating the danger of addiction."

STOLEN ORDER FORMS FOR NARCOTICS.

Narcotic Circulars report on lost and stolen order forms. They advise, if such forms are presented, that they be forwarded to the Treasury Department, office of the Commissioner of Narcotics, or advise the Commissioner of the names on the forms and the name and quantity of each item of narcotic drug requested.

Pharmacists desire to be helpful in exposing illegal vendors.

PERSONAL AND NEWS ITEMS.

Professor I. M. Kolthoff, head of the division of analytical chemistry at the University of Minnesota, is giving a series of lectures at Charles University, Prague. Later, he expects to visit Holland, before his return about the middle of August.

Dr. Elmer D. Merrill, of Harvard University, in an address before a Washington audience of scientists, contended that botany is the oldest of the sciences. He stated that the men of the old school had to know plants in the woods they inhabited, which were good for food and medicine and those that were poisonous. He contended that the early writings along these lines were for the purpose of making their knowledge a matter of record.

The 96th birthday of **Wilhelm Bodemann** was celebrated on June 4th by the Chicago Veteran Druggists' Association. The Veteran was present on the occasion and he was toasted by **Samuel C. Henry** who is again making his home in Chicago.

Sir Henry Wellcome was in Milwaukee recently on his way back to England after a visit to his old friends Drs. Charles and William Mayo at Rochester, Minn. He was tendered a luncheon at the Schroeder Hotel by a group of nine Milwaukee pharmaceutical leaders. Sir Henry was born near Almond, Wis., 85 years ago, the son of a missionary among the Indians.

H. C. Christensen, secretary of the National Association of Boards of Pharmacy, was in Dallas recently in the interest of Medicine, Dentistry and Pharmacy at the Centennial. The exhibit at the Dallas show will be less extensive than the one in Chicago. This is on account of the limited space available for the exhibit; however, the exhibit will be of interest to every one connected with pharmacy and the drug trade, as well as laymen. The progress of pharmacy will be shown along with that of medicine and dentistry.

Miss Esther H. Barney, who was in charge of the pharmacy exhibit at the Century of Progress Exposition through both summers of its operation and who contributed greatly to its success, will be in charge of the pharmacy exhibit at the Texas Centennial. Miss Barney is a graduate registered pharmacist and a graduate nurse and has had wide experience in these two important fields of public health.

Dr. John C. Krantz, Jr., will speak before Maryland Pharmaceutical Association (meets in Baltimore, June 23rd–26th) on "Relationship of Pharmacology to the Practice of Medicine." Dr. Krantz is Professor of Pharmacology in the School of Medicine, University of Maryland.

Samuel L. Hilton is on the Maryland program. He will discuss "Prescription Practice" in relation to some of its difficulties, a subject in which he is an outstanding authority.

William F. Reindollar is now chief of the Bureau of Chemistry of the Maryland State Department of Health. He is referee on Preservatives and associate referee on Ointments of the Association of Official Agricultural Chemists. He has been associated with the State Department of Health for the past several years.

William R. Acheson was honored with the degree of Doctor of Pharmacy by Massachusetts College of Pharmacy.

Edward Spease, dean of Western Reserve University School of Pharmacy, delivered the address to graduates of Philadelphia College of Pharmacy—his subject was "Keeping the Faith."

The pharmaceutical interests were represented at the Interallied Convention held at Sioux Falls, on May 6th, by **Secretary E. F. Kelly** and **Prof. E. R. Serles.** The latter presented a paper on Drug Standardization. All divisions of medical practice were represented.

Prof. J. Lester Hayman, former head of the Department of Pharmacy at the University of West Virginia, has been named Director of the new College recently instituted by the Board of Governors of the University. Among others in the College of Pharmacy are **Professors G. A. Bergy** and **Fred L. Geiler.**

The *News Edition* of June 10th, *Industrial and Engineering Chemistry,* outlines the activities of the University situated in the tallest college building in the world. Reference is made to Duquesne University College of Pharmacy, of which Hugh C. Muldoon is the dean, and in connection with the University, refers to the School of Pharmacy of which **Dean C. Leonard O'Connell** is at the head. Mellon Institute of Industrial Research is a Branch of the University; Dr. George D. Beal is Director.

About twenty students and members of the faculty of Philadelphia College of Pharmacy and Science recently visited the AMERICAN INSTITUTE OF PHARMACY.

Dr. Celestin Garcia Morales, Havana, who is actively associated with the work of the Spanish revision of U. S. Pharmacopœia XI, was a visitor at the AMERICAN INSTITUTE OF PHARMACY. He was accompanied by Mrs. Morales.

Dr. George F. Zook, president of the American Council on Education, was the speaker at the commencement exercises of the Medical College of Virginia. Nine graduates in pharmacy received degrees. The honorary degree of Doctor of Science was conferred on Dr. Lawrason Brown, of Trudeau Sanatorium, Saranac Lake, New York.

Remington Medalist-elect, **Professor E. N. Gathercoal** and Mrs. Gathercoal were visitors at the AMERICAN INSTITUTE OF PHARMACY. The award will be a feature of Pharmacy Week.

Mrs. Nellie Perry Watts, wife of a West Chester, Pa., pharmacist, won eleven prizes at Philadelphia College of Pharmacy and Science: The Procter prize, the Frank Gibbs Ryan prize, the William B. Webb memorial prize, the Frederick William Hausman Memorial, the Lamba Kappa Sigma Sorority, the Women's Auxiliary of the Dauphin County Pharmaceutical Association, Remington Memorial, the Mahlon N. Kline and the prize of the Alumni Association.

A. PH. A. MEMBERSHIPS.

Duquesne University School of Pharmacy awarded the following memberships in the AMERICAN PHARMACEUTICAL ASSOCIATION: For excellence in Pharmacy, Thomas Lloyd Barnhart, Braddock, Pa., awarded by Professor Noel E. Foss.

For excellence in Materia Medica, Edward Bardell Yeager, Carrick, Pa., awarded by Professor Elbert Voss.

For excellence in Chemistry, Angelus E. Rihn, Ford City, Pa., awarded by Dean Hugh C. Muldoon.

MASSACHUSETTS COLLEGE OF PHARMACY, A. PH. A. PRIZES.

The prizes, consisting of a nomination to membership and a year's dues in the AMERICAN PHARMACEUTICAL ASSOCIATION, were presented by several officers and teachers of Massachusetts College of Pharmacy. These prizes were awarded to members of the graduating class named, who have made high averages on the senior work in all subjects and exceptional records in separate subjects.

Organic Chemistry, awarded to Henry J. Gillen by Treasurer Gammon. *Materia Medica,* awarded to Ella Lehrman by President Glover. *Pharmacy,* awarded to Otto H. Anderson by Associate Professor Thompson. *Commercial Pharmacy,* awarded to Benjamin P. Hecht by Vice-President Ellis. *Analytical Chemistry,* awarded to Frank Shinopulos by Dean Bradley.

THE SECTIONS.

Scientific Section.—*Chairman,* H. M. Burlage, Chapel Hill, N. C.; *First Vice-Chairman,* G. L. Jenkins, Baltimore, Md.; *Second Vice-Chairman,* Justus C. Ward, Denver, Colo.; *Secretary,* F. E. Bibbins, 5840 Washington Blvd., Indianapolis, Ind.; *Delegate to House of Delegates,* E. V. Lynn, Boston, Mass.

Section on Education and Legislation.—*Chairman,* C. Leonard O'Connell, Pittsburgh, Pa.; *Vice-Chairman,* George C. Schicks, Newark, N. J.; *Secretary,* George A. Moulton, Peterboro, N. H.; *Delegate to the House of Delegates,* L. W. Rising, Seattle, Washington.

Section on Practical Pharmacy and Dispensing.—*Chairman,* L. W. Rising, Seattle, Wash.; *First Vice-Chairman,* F. L. Black, Baltimore, Md.; *Second Vice-Chairman,* H. A. K. Whitney, Ann Arbor, Mich.; *Secretary,* Leon W. Richards, Missoula, Mont.; *Delegate to the House of Delegates,* H. M. Burlage, Chapel Hill, N. C.

Section on Commercial Interests.—*Chairman,* R. W. Rodman, New York, N. Y.; *Vice-Chairman,* R. T. Lakey, Detroit, Mich.; *Secretary,* H. F. Hein, San Antonio, Tex.; *Delegate to the House of Delegates,* Henry Brown, Scranton, Pa.

Section on Historical Pharmacy.—*Chairman,* Heber W. Youngken, Massachusetts College of Pharmacy, Boston, Mass.; *Secretary,* Loyd E. Harris, Norman, Okla.; *Delegate to the House of Delegates,* C. O. Lee, Purdue University, La Fayette, Ind.; *Historian,* E. G. Eberle, 2215 Constitution Ave., Washington, D. C.

All sections report some papers. All contributors should at once send in titles of papers and abstracts of them as far as possible. July will be the last issue of the JOURNAL to reach the members prior to the convention, therefore, the tentative programs should be published in that number.

The annual program should be prepared in July, therefore, Section officers are urged to send in the copy as early as possible—coöperation is essential to serve you.

SOCIETIES AND COLLEGES.

CONFERENCE OF TEACHERS OF PHARMACOGNOSY AND PHARMACOLOGY.

Officers.—*Chairman*, Charles E. F. Mollett; *Secretary*, Ralph Bienfang.

PROGRAM.

Topic for Discussion: "The Relationship between Pharmacology and Pharmacognosy;" led by Chairman Mollett.

Papers: "A List of Vegetable Drugs for a Course in Pharmacognosy," Kenneth Redman.

"Drug Collection and Cultivation in Mississippi," W. W. Barkley.

"Class Background Studies—a Survey of Some of the Ways Used by Students Attending a College of Pharmacy and Science in Solving the Money Problems," Marin S. Dunn.

"Preliminary Chemical Investigation of the Berries of *Rhus glabra* Linné," G. H. McFadden and R. L. McMurray.

"Biographical Notes on Teachers of Pharmacognosy. 1. Ibrahim Ragab Fahmy. 2. T. E. Wallis. 3. Antun Vrgoc.," Ralph Bienfang.

"General or Pharmaceutical Botany for Pharmacy Students," Lovell D. Hiner.

"Elders of Northwestern United States," Forest J. Goodrich.

"Ferns of the Northwest," Forest J. Goodrich.

"Crude Drug Imports," B. V. Christensen.

STATE ASSOCIATION MEETINGS—JULY, AUGUST AND SEPTEMBER.

Ohio.—*President*, Garrett Emch, Toledo; *Secretary*, Victor Keys, Columbus. *Cedar Point, July, third week.*

Oregon.—*President*, John F. Allen, Corvallis; *Secretary*, Lawrence Stovall, Maupin. *Gearhart, July 6th-8th.*

Tennessee.—*President*, L. S. Elgin, Knoxville; *Secretary*, Tom C. Sharp, Nashville. *Nashville, July 20th-23rd.*

New Hampshire.—*President*, George A. Moulton, Peterboro; *Secretary*, Rodney A. Griffin, Franklin. *The meeting will be held in September.*

AMERICAN PHARMACEUTICAL MANUFACTURERS' ASSOCIATION.

The American Pharmaceutical Manufacturers' Association closed its annual sessions at Hot Springs, Va., on June 11th. The officers of the Association were reëlected: *President*, George R. Flint, Decatur, Ill.; *First Vice-President*, Carrol Dunham Smith, Orange, N. J.; *Second Vice-President*, J. C. Fausnaught, Worcester, Mass.; *Secretary*, C. W. Warner, Newark, N. J.; *Treasurer*, Frank A. Mallett, Des Moines, Iowa.

The Association went on record endorsing Senate Bill 5.

PLANT SCIENCE SEMINAR.

This year's Seminar will be held at a camp in the heart of a 6000 acre State Park and Game Preserve on the headwaters of the Fourche-Moline Creek. It is 9 miles north of Wilburton, Oklahoma, on State Highway No. 2 in the San Bois Mountains.

The camp is in the pine-oak association of the Kiamichi Mountains. The more conspicuous trees are *Pinus echinata, Quercus marilandica* and *Quercus stellata*. Other plants of interest are witch-hazel, flowering dogwood, May-apple, an abundance of redbud, sassafras, river birch and wahoo. The vegetation resembles that found in southern Arkansas and northern Louisiana.

THE CAMP.

The camp has five buildings of native stone that are suitable for sleeping quarters, each one accommodating comfortably, eight people. In addition there are pyramidal tents which may be set up for family groups. It has a gravity flow of water secured from a spring, shower baths, etc.

Excellent camp meals and camp facilities will be provided at the rate of not more than $2.25 per day for adults, and $1.00 for children under twelve.

Director Joe H. Thompson, of the Conoco Travel Bureau, writes:

"To any member of the Plant Science Seminar who thinks of motoring to the meeting, the Conoco Travel Bureau, Denver, Colorado, offers free travel service. They will send you, on request, a set of state maps individually marked for you, to show you the best and most direct routes from your home to the Seminar. The types of roads and road conditions will be indicated, and lists of hotels and cottage camps included.

"In addition you will receive beautifully illustrated literature descriptive of places of interest along the way." They are 9 by 12

inches in size and are interleaved with descriptive literature, camp lists, etc., and are neatly bound. The Bureau outlines your route over each map. They are free for the asking; address Conoco Travel Bureau, Denver, Colorado, and ask for a routing to the Seminar.

TENTATIVE PROGRAM.

Monday, August 17th, Arrival at Camp. Registration and get acquainted.

Tuesday, August 18th, 7:30 A.M., Breakfast. 8:30–11:30, short hike and botanizing trip. 12:00 Noon, Lunch. 2:30–4:30, Program in Main Hall. 6:15 P.M., Dinner.

Wednesday, August 19th, 7:30 A.M., Breakfast. 8:30–4:00 P.M., auto trip under the direction of the State Forester. (Lunch to be furnished by the Camp.) 6:15 P.M., Dinner.

Thursday, August 20th, 7:30 A.M., Breakfast. 8:30–11:30, short hike and botanizing trip. 12:00 Noon, Lunch. 2:30–4:30, Program in Main Hall. 6:15 P.M., Dinner.

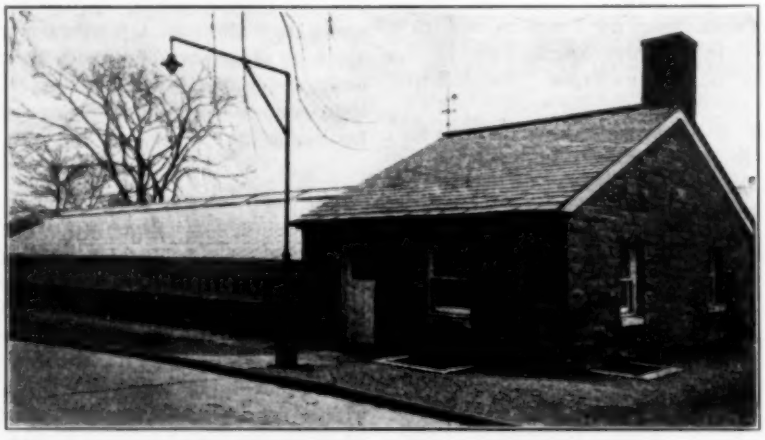
Friday, August 21st, 6:30 A.M., Breakfast. 7:30 A.M., Break Camp and auto caravan through some Oklahoma Oil Fields. Lunch at Platt National Park. On to Dallas.

COMMENTS.

The following papers have been promised: "Ecuadorian Sarsaparilla," by Heber W. Youngken. F. J. Bacon will have two papers, titles to be announced. L. K. Darbaker will bring motion picture films of former Seminars.

The completed program will be announced in next issue.

The officers are: *President*, F. J. Bacon, Western Reserve University; *Vice-President*, A. W. Matthews, University of Alberta; *Secretary*, E. H. Wirth, University of Illinois, 715 S. Wood St., Chicago, Ill.; *Local Secretary*, Loyd E. Harris, University of Oklahoma. *Members of the Executive Council:* Frank H. Eby, Temple University; William B. Day, University of Illinois.



Green House at Fordham University.

PHARMACEUTICAL PLANT GARDENS.

H. J. Holthoefer, an enthusiastic gardener, and Dr. Frank B. Kirby have taken up the possibility of a medicinal plant garden somewhere in Lincoln Park, Chicago.

Dallas has a park named in memory of Julien Reverchon, late botanist at Baylor University College of Pharmacy. (The latter has been discontinued.)

Herewith is shown the Green House in the botanical garden of Fordham University Department of Science, completed under the direction of Prof. William J. Bonisteel. The building is 28 by 70 feet.

AMERICAN DRUGGISTS' FIRE INSURANCE COMPANY.

The annual meeting of the American Druggists' Fire Insurance Company (30th anniversary) was held during the week of June 1st. Representatives of various State and National pharmaceutical organizations were in attendance as guests, and representatives of the Company celebrated an annual homecoming.

Elaborate programs were provided and the visitors enjoyed a garden party at the home of Mr. and Mrs. F. H. Freericks.

CONNECTICUT PHARMACISTS.

Connecticut pharmacists will hold their sixtieth Anniversary meeting, June 24th and 25th, at New London. **Secretary Alice-Esther Garvin** states that it will be a unique, inspirational, valuable and social meeting. There will be an exhibit and the program has been prepared by John H. James; President Joseph A. Murphy will preside; John J. Dugan, the first graduate of Connecticut College of Pharmacy, will be in charge of the professional phase. Among the speakers will be Dean C. Leonard O'Connell, of Pittsburgh College of Pharmacy; Dr. J. Leon Lascoff; Secretary John Dargavel, N. A. R. D.

TEMPLE UNIVERSITY.

Louis Weiner was awarded the John R. Minehart Gold Medal, the Henry Fisher Gold Medal (Materia Medica), the H. Evert Gold Medal (Pharmacy), James C. Attix Prize, Alumni Medal (Pharmacy Laboratory), the Robert L. Swain Prize (Pharmaceutical Law), Herman E. Lecks Prize (Chemistry).

Pharmacy Alumni Medal (Chemistry Laboratory), was awarded to Raphael Abrams; Microscopy, Armand Bernabei; Character and Scholarship, Anthony Borgia; Gold Medal for second highest average, Raphael Abrams. A. I. Kremens received Gold Medal in recognition of sacrifices and perseverance; Circolo Italiano Prize, highest scholastic average, Yolando Monticelli. John Howard Graham Physics Prize was awarded to T. A. Walb.

MARYLAND UNIVERSITY.

Charles Henry Davis, 71-year-old New York philanthropist, announced plans for the development in his address to the graduating class. Ultimately, he said, 22 new buildings may be built on the campus, with funds and equipment donated by "several interested persons."

Governor Harry W. Nice also spoke at the annual graduation exercises.

THE SCHOOL OF PHARMACY.

Melvin F. W. Dunker received the degree of "Master of Science" from the Graduate School of the University of Maryland, the major part of the work having been done in the School of Pharmacy.

Casimer T. Ichniowski and Harry Rosen received the degree of "Doctor of Philosophy" from the Graduate School of the University of Maryland, the major part of the work having been done in the School of Pharmacy. Dr. Ichniowski and Dr. Rosen specialized in Pharmacology.

Honors were awarded: Gold Medal for General Excellence, Bertram Kamber; The William Simon Memorial Prize for Proficiency in Practical Chemistry, Carroll P. Foster; The Simon Solomon Prize ($50.00) for most satisfactory work in the third and fourth years of the course, Frank A. Bellman; The Lawrence S. Williams Practical Pharmacy Prize ($25.00), Paul H. Thompson; The Conrad L. Wich Botany & Pharmacognosy Prize ($15.00), Benjamin Levin.

Certificates of Honor were awarded to Nathan Levin, Alexander Ogurick, Frank A. Bellman. Honorable mention to Albert Heyman, Bernard L. Zenitz, Leonard Rapoport.

THE ALUMNI.

The Alumni of the School of Pharmacy held their annual banquet June 3rd, at Lord Baltimore Hotel. Rabbi Dr. Edward L. Israel delivered the annual address. Other speakers at the banquet were H. C. Byrd, president of the university; Dr. Andrew G. DuMez, dean of the School of Pharmacy; Dr. Hyman Davidov, president of the Alumni Association; William M. Fouch, honorary president of the Alumni Association; Dr. J. Milton Patterson, Cumberland, member of the board of regents of the University. L. B. Wright, of the traveling affiliates of the Maryland Pharmaceutical Association, presided as toastmaster.

PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE.

Philadelphia College of Pharmacy and Science honored Irwin Atwood Becker, Illinois; Adley Bonisteel Nichols, Pennsylvania; Edward Spease, Ohio, with the degree of Master of Pharmacy. Degrees, conferred in Course, were awarded to John Hampton Hoch, South Carolina, and Paul Alvin Mattes, Pennsylvania—"Doctor of Science in Biology." "Doctor of Science in Bacteriology" was awarded to Francis Cornelius Lawler, California, and John Neumann McDonnell, Pennsylvania. "Master of Science in Chemistry" was earned by Arnold Koff, of New Jersey; William Frederick, Jr., Charles Clifton Pines, Louis Alexander Reber, Philip Rubenfein, Frederick Walter Schreiber and Reber Steiner, of Pennsylvania. The degree of "Master of Science in Bacteriology" was awarded to George Mohlivere Eisenberg, of Pennsylvania; and "Master of Science in Biology"—Berkon Melkon and Martin Sylvester Ulan, of Pennsylvania.

PARAGRAPHS FROM A COMMENCEMENT ADDRESS.*

BY HUGH CRAIG.

Other parts of the address could have been selected; all have an impressive meaning.

You are now graduates in pharmacy.

The graduated glass, as you know, has space above the top line of its calibrations. Your graduation also leaves a similar, superior space. That is where will be engraved the marks you make yourself—and there is no maximum limit other than that which you set.

Your graduation, like that of the measuring glass, equips you for a particular service. It assures you nothing beyond the recorded ability. It makes no opportunity for you, but it gives you a certain ability to recognize and realize opportunities. It enables you, to an extent, to make your own opportunities—and there is no overproduction of opportunities in the drug field; in truth the pharmacal side of the retail drug business was never more promising for those who have the ability and the will to develop it.

When I was in the retail drug business we leaned more heavily on the pharmacal side of the business than is the general practice at the present time. To-day, the druggist's sorriest woe is that caused by unfair competition, of which price-cutting is the major symptom, aggravated by discrimination in the prices at which over-the-counter goods are sold to competitors of various classes.

This, too, is a debatable economic problem. Like all other economic problems it arises from a distortion of social relations. For this reason it cannot be solved by legislation alone. In fact, the efficacy of any legislative remedy for this economic evil, beyond a psychological influence, is practically negligible.

The real remedy lies in the development and acceptance of fair-play in the relationships of man to man. It requires primarily knowledge and appropriate use of the halogens of the social system.

You are familiar with the chemical halogens. The social halogens have the same symbols, but different names—F designates faith; Cl, cleanness; Br, brains; I, integrity.

The social halogens also have a periodic grouping different from that of the chemical halogens.

Like the chemical halogens, those of the social system are multivalent. Again similarly they form very important compounds with H—which is humanity. Their most useful combinations are those which contain the C of courage. Those who have the courage to apply their faith in all their actions; who will be clean in all that they do; who will not prostitute their intelligence; who stand firm in integrity—these are the leaders of men.

When there has been developed a reasonably large supply of the C compound of the social halogens, which will contain all the latter, all economic problems will be solved; for that compound is a most efficacious social solvent.

Human relations are the basis of all economic conditions. . . .

The greatest service performed by any one letter of the alphabet is that of the letter "s," in converting the brain, an anatomical structure, into brains, an instrument of intelligence. But, no letter or letters, not even Ph.G. or Ph.D., have yet contrived the intelligent use of that instrument.

How beneficial it would be if all members of the drug trade made full use of their brains to analyze their problems and especially to analyze the solutions proffered therefor; and, combining the Br with the C of courage, refused longer to be misled, and proceeded to carry through to the intelligently determined end!

Integrity is the greatest of the social halogens. Its antiseptic power, prophylactically and remedially matches in efficacy that of its chemical analog—iodine—and it is absolutely harmless to all but pathogenic organisms. Unfortunately integrity is the rarest element of the social system. This is regrettable, but it is not the end. The world's supply is constantly getting larger. . . .

You are engaging to perform a useful service. Your success will be the measure of your ability to look to causes, beyond the symptomatic effects, in the problems that you meet. Start with yourselves when you see a need for improvement in anything in which you have a part.

You have been admitted through the outer gate of the oldest honorable profession. You need not respect its age; but please always respect its honor. You have yet to pass the inner portal where the board of pharmacy stands guard. . . .

* The College of Pharmacy of the City of New York, Columbia University.

Death of Dr. J. T. Mason, president of American Medical Association, Seattle, on June 20th, is reported June 20th.

LEGAL AND LEGISLATIVE.

THE ALBERTA CODE OF FAIR COMPETITION.

Section six of article six reads as follows:

"No retailer shall give to any customer any premium, free goods below his regular price in any type of combination offer, secret discounts, rebates, free samples of commercial size or special services, for which the customer would be in the ordinary course of business charged for such by the retailer, nor shall he issue any false or inaccurate invoice or quotation, imperfectly recording or concealing the true facts of any transaction."

ALABAMA BARBITURIC ACID LAW.

The State Legislature recently passed a law here requiring that trional, sulphonal, tetronal and other barbituric acid products be sold only by prescription. Dr. J. N. Baker, state health officer, has requested the coöperation of druggists and doctors with state officials in the enforcement of the new ruling. The act provides for a fine of $10.00 to $500.00 for violations.

U. S. DRUG BUREAU AND THE NEW STANDARDS.

P. B. Dunbar, Assistant Chief of the Administration, in a letter to the Drug, Chemical and Allied Trade Section of the New York Board of Trade said: Where articles in the 11th revision are "materially different" in composition or strength from those in the 10th revision, and particularly where a product, because of its potency, is regarded by the medical profession as a highly important drug, such as tincture of digitalis, "there is not only a legal, but a moral obligation upon manufacturers and distributors to market their products strictly in accordance with the requirements of the act."

"The Federal Food and Drugs Act specifically provides that articles sold under official names must comply with the standards provided by the United States Pharmacopœia or National Formulary official at the time. In order to enable manufacturers and distributors of drugs to familiarize themselves with the changes and to permit them time to adjust their preparations and labelings to conform with the new standards, the Revision Committees set the time when these works would become official approximately six months after the date of their publication.

"There is, of course, a realization on our part of the practical difficulty of having all official articles in the channels of commerce comply with the requirements of the U. S. P. X on May 31st and those of U. S. P. XI on June 1st. The Bureau of Chemistry, at the time previous revisions became effective, recognized this difficulty, and it is not the purpose of the Food and Drugs Administration to adopt a more stringent attitude during the present transition period.

"Fortunately, there are comparatively few articles in which the standards in the two editions are materially different. In such cases there is no public health or economic reason for insisting on an exacting label differentiation between the two types of products."

A LEGAL OBLIGATION.

"Where articles recognized in the eleventh revision of the Pharmacopœia are materially different in composition or strength from those described in the tenth revision, and particularly where the product, because of its potency, is regarded by the medical profession as a highly important drug, such as tincture of digitalis, there is not only a legal but a moral obligation upon manufacturers and distributors to market their products strictly in accordance with the requirements of the act.

"There is, of course, no objection to the marketing during the period between now and June 1, 1936, of preparations made according to the forthcoming standard in order that these products may be available for prescription and other uses after June 1st. In the interest of safety, however, it is highly desirable that the labelings of these products prominently warn the purchaser that they conform to the new standard and differ from the old."

TEXAS CHAIN STORES TAX ATTACKED.

The issue as to whether a single store or chain of stores has the advantage in merchandising and advertising was raised in testimony Monday in the opening of the attack by 827 Texas chain stores on the validity of the State's graduated tax on chains before Judge Royall R. Watkins of Ninety-Fifth District Court.

The chain store attorneys sought to show through examination of two witnesses that the single store has the advantage in business, and added to this the claim through testimony that

syndicate methods of buying and advertising by single stores gives them an advantage.

The State countered with cross-examination designed to show that ownership of sources of revenue in many localities is advantageous in operation over single-locality merchandising on the ground that prospering stores would help bear the burden of stores which were less prosperous.

The suit is brought by several chains which claim their annual tax under the law would total $716,817.50. Temporary injunctions issued by Judge Watkins in January prevent the enforcement of the tax law.

BOOK NOTICES AND REVIEWS.

A. Avigdor, export manager of Laboratorio Quimico Central, S. A., has published a new directory covering all physicians and pharmacists in Mexico. It contains very interesting information on hospitals, scientific societies, National University of Mexico and its various departments, charity organizations, etc.—the name is Directorio Medico Mexicano and it is a source of valuable information. Price $2.50.

The Medical Formulary and Prescription Manual. A Treatise on prescriptions and prescription writing by MORRIS DAUER, Ph.G., Chief Pharmacist at Kings County Hospital, Borough of Brooklyn, City of New York. Approved and adopted by the Department of Hospitals, City of New York, September 13, 1934. First edition.

In this compact volume the author has presented in practical form, prescriptions prepared and carefully checked through many years and designed for use as a modern Medical Formulary and Prescription Manual. The book is divided into fourteen departments including all the specialties of medicine together with their many subdivisions. Thus we have external and internal preparations for use by dermatologists, prescriptions used by cardiologists, gynecologists and obstetricians, ophthalmologists, otologists, pediatricians, surgeons, urologists, laryngologists as well as prescriptions used in diabetic medication, and various other prescriptions for external and internal use including prescriptions for glandular products.

The author also discusses such interesting topics as aromatics and coloring in prescriptions, giving the busy practitioner a quick and reliable review of this phase of the prescribing art.

Conversion tables of weights and measures, percentage solution tables and a well-prepared index complete the volume.

In addition to supplying considerable information for the use of hospital staffs this book will also be found useful in promoting prescription compounding and prescription writing where joint committees of physicians and pharmacists are engaged in the various counties and states in promoting this very important activity.—R. P. FISCHELIS.

It is necessary to defer other Book Notices and Book Reviews to succeeding issues of the JOURNAL.

WISCONSIN BOARD OF PHARMACY.

Appointment of Edward Kremers to the state board of pharmacy has been announced by Governor Philip F. LaFollette; also of S. H. Dretzka, former president of the Wisconsin Pharmaceutical Association; H. G. Ruenzel, Milwaukee, was named secretary of the Board.

WEST VIRGINIA ASSOCIATION.

West Virginia Association will hold its annual session at White Sulphur Springs, June 29th and 30th. Among the speakers listed are: E. F. Kelly, Jerry McQuade, John W. Dargavel, Congressman Wright Patman.

The *Bulletin* for June carries much information and evidences the attention given to matters concerning druggists. Immediate attention was given by its editor to the article in *Colliers* of May 23rd.

NEW MEXICO ASSOCIATION.

The most successful meeting in the history of the New Mexico Association was held in Albuquerque May 20th. President Welch delivered a most forceful address, giving a résumé on the activities of the Association during the past year and laying special stress on what must be done in the future for the advancement of pharmacy.

Secretary Charles J. Clayton, of the Colorado Pharmaceutical Association, presented a comprehensive paper on national legislation.

The following are the new officers of the Association: *President,* H. I. Braden, Carlsbad; *First Vice-President,* S. J. Mollands, Taos; *Second Vice-President,* Covey Baker, Las Cruces; *Secretary-Treasurer,* H. E. Henry (re-elected), Albuquerque.